The Greater Opportunity of the "Wire-Your-Home" Campaign—*for Central Station, Contractor, Manufacturer and Dealer—with articles on house-wiring methods, the electric-flag campaign and other service-selling topics*

PERIODICAL ROOM RECEIVED MAR 2 1916 Engineering Library

Electrical World

Volume 67, Number 13 McGraw Publishing Co., Inc. New York, March 25, 1916

"IS this the Electric Shop?--

* * * * *

"This is Mrs. Hood, 916 Prospect Terrace.

* * * * *

"I wish you'd send up a Western Electric six inch fan--I read about it in the magazines and last evening I saw one in your window.

* * * * *

"Yes, indeed, I'm very much pleased with the Western Electric iron--vacuum cleaner--washer--and other household helps I purchased from you--that's why I now want a Western Electric Fan.

* * * * *

"By the way, if you'll send up your man, he can make an estimate on putting in some more outlets--Mr. Hood says this is 'Wire Your Home' Month.

* * * * *

"Don't forget the Western Electric six inch fan, please.

* * * * *

"Yes, this afternoon,

* * * * *

"Thank you.

* * * * *

"Good-bye."

Western Electric Company

INCORPORATED

Your Electrical Instruments— The Pulse of Your Plant!

Your Electrical Instruments are the pulse of your plant, whether central station, individual plant or laboratory. Upon their efficiency depends the efficiency of your electrical equipment.

Every electrical engineer knows this, and nearly all know that

Weston

A. C. Switchboard Indicating Instruments

POWER-FACTOR METER

AMMETER

are unrivalled with respect to mechanical and electrical design and workmanship, and hence with respect to performance.

Competent engineers know that this Weston group is the only one which perfectly meets the practical requirements of operating service, and they likewise know that the initial cost is little if any more than the cost of inferior instruments and that because of their continuous accuracy and serviceability they are much more economical to adopt than instruments of any other make.

The Instruments, consisting of Ammeters, Voltmeters, Wattmeters (Single and Polyphase), Power Factor Meters, Frequency Meters and Synchroscopes, are thoroughly described in our Catalog 16.

Complete groups of Weston Switchboard Instrument Transformers are described in our Bulletin 1501.

VOLTMETER

WATTMETER
Single and Polyphase

Weston Electrical Instrument Co.

13 Weston Ave., Newark, N. J.

New York	Boston	Chicago	Toronto	Berlin
Buffalo	Philadelphia	Detroit	Winnipeg	London
Cleveland	St. Louis	Denver	Montreal	Paris
Cincinnati	Richmond	San Francisco	Vancouver	Petrograd

Florence, Johannesburg, South Africa

Electrical World

The consolidation of ELECTRICAL WORLD AND ENGINEER and AMERICAN ELECTRICIAN.
Published by McGraw Publishing Company, Inc.

Vol. 67 NEW YORK, SATURDAY, MARCH 25, 1916 No. 13

Profit in Concerted Action

FEW events since the industry first began to work together for commercial progress have given stronger evidence of the possibilities of concerted effort than the national housewiring campaign now in progress. This year, the central stations, the contractors, the jobbers and the manufacturers have all united in a movement to widen the application of electricity. For years each community has considered itself a unit in such development. It has made its plans alone and without relation to the outer world. If by good management the local family of electrical men were brought into accord it was the most that could be asked for. As a result the greatest development has taken place only in those communities where some man of vision has seen the possibilities of promoting the common interests of central station, contractor and jobber. This year we have gone another step—another and a long one. We have seen the industry throughout the nation agree on a definite plan, on a general scheme for carrying out a campaign and on the best time for such a concerted effort. The combined effort has given an added value to important but scattered local enterprise and stimulated others to do likewise. We seem to have nationalized enthusiasm and to have given a sense of direction to broad commercial movements in the industry which may expect to develop more and more each year. In other words, the judgment of the industry has been defined and adopted. Electrical Prosperity Week indicated what could be done by concentrated effort. This national housewiring campaign this spring marks a second great concerted movement, and America's Electrical Week next fall should gain impetus from both.

A Commission Playing Politics

CHAIRMAN Oscar Straus of the Public Service Commission for the First District of New York, on behalf of himself and his colleagues, has telegraphed to the chairman of the Senate Committee in Albany that the commission would look with favor on new legislation reducing rates to gas consumers in certain boroughs of New York and "is not interposing any objection to action by the Legislature." Action such as this on the part of a public service commission is without precedent. The regulation of rates is the function of the commission bestowed on it by the Legislature. Why then, clothed with all the necessary authority and having already taken all the testimony in the case, should it shirk its responsibilities? It is the duty of the commission to determine from the facts presented whether the rates and service in the case in question are just and reasonable. If it finds that a reduction in the price of service is warranted, why does it not order it? Why does it ask the Legislature to infringe on its prerogative and even suggest action which will leave the utilities practically without redress, for under the law as interpreted by the Supreme Court proof that a rate is confiscatory must be submitted before that body will interfere. If the fixing of rates is now to revert back again to the Legislature what is the use of foisting an expensive commission on a community? A political move of this kind cannot but be viewed with concern by the utilities of the State.

The Electrical Supply Manufacturers

THE Associated Manufacturers of Electrical Supplies has grown to remarkable proportions in one year. Drawn together originally to consider the menace of a proposed system of concentric wiring in this country, the manufacturers realized for the first time their lack of organization and then and there proceeded to remedy the defect. It was not long after that that the organization found itself, and with it came the realization of great potentiality for constructive work vastly more important to it and to the industry than the subject of concentric wiring. To-day it boasts of ten important sections with forty or more division committees, in which more than 200 executive and associate representatives of member companies are genuinely busy, and the work has only just begun. There is strong ground for hoping that we shall soon have an organization which, while it may not include every manufacturer, will be able to exert such influence as shall make it a power in the land and render it capable of safeguarding the best interests of the electrical manufacturing industry. Everything is possible to a strong organization, and whether or not American manufacturers desire to cater to the markets of the world, it is certain that the economic struggle, which is expected to follow the war, will find them now better prepared and equipped for the inevitable competition. Not in a spirit of mutual rivalry but in strong combination, the Associated Manufacturers of Electrical Supplies have determined to sink, as far as practicable, their individual interests and adopt a uniform policy in matters of principle. Greater standardization of electrical supplies will naturally follow, after which the organization will be able to cope with the broader commercial problems which will confront it. The spirit and enthusiasm with which the manufacturers have entered upon the work of the organization augurs well, and with that spirit success is sure of attainment.

General and Local Lighting

ONE of the important questions just now arising by reason of the introduction of gas-filled incandescent lamps is the extent to which this highly efficient source of light will tend to encourage the general illumination of working spaces, as against the common method of supplying some general illumination plus strong local sources of light. Of course, if expense were no object the generally pleasing effect of complete illumination of a room and the convenience of being independent of any fittings designed for local lighting would cause the latter to fall into disuse. Where, however, it is necessary to get very strong illumination at certain points, and quite unnecessary elsewhere, it is an obvious economy not to waste light where it is not wanted, and this economy will be carried out wherever the cost of light is an item seriously worth considering. The greatly increased efficiency of the gas-filled units puts a somewhat different phase on the matter, for without increase of cost it would sometimes prove possible by making the change from the older to the newer type of lamp to go extensively into general lighting and to abandon desk lamps and the like, at least so far as expense is concerned.

Just at this point enters the psychology of the situation, a not inconsiderable factor in all problems of illumination. It certainly is a fact, however, little based upon sound reason, that a clerk or a workman who finds his desk no more strongly illuminated than an unused bench or a table at his side instinctively draws the conclusion that he is not getting sufficient light. Rightly or wrongly, he feels dissatisfied and complains that the general illumination is quite insufficient to meet the requirements of his work. Moreover, if one desk in a dark corner actually requires the use of a desk lamp to obtain good results, the presence of that lamp creates a supposed necessity at every other desk or work bench in the room. The mind seems to hark back through a generation or two to the time when universal illumination was out of the question and the only thing available was a lamp shining directly upon the work. Every illuminating engineer remembers to his sorrow trying to meet this particular situation.

Another psychological factor, too, enters the case in a similar way. It sometimes seems as though, through precedents established by the worst of bad lighting, sufficient light is associated in the minds of the user with the existence of unpleasant glare from the lamp, so that he is never really quite happy unless there is glare to dodge. The persistence with which desk lamps if movable are shifted to where the light will be reflected directly from the work into the eyes is curious evidence of this baneful kind of associative reasoning. Will the new lamps with their greater efficiency enable the illuminating engineer to advance to the simpler scheme of general illumination sufficiently good to meet all working requirements? We know of no experiments carried out yet in a sufficiently rigorous manner to answer this inquiry. In certain places where, for example, the semi-indirect system can be successfully carried out, the great simplicity of lighting with big gas-filled units and the low cost of wiring in installation ought to encourage a change from the old practice. It will be most interesting to compare the relative economy and working efficiency of the two in similar rooms used for similar purposes, as, for example, on two floors where the conditions are otherwise approximately the same. Perhaps some engineers may have had an opportunity to try out the matter in practice, and if so the results would be most instructive to record.

The Sale of Surplus Power

ONE of the most striking examples of a successful supply of power in bulk is furnished by the Great Northern Power Company, which delivers energy from its generating plant on the St. Louis River to Duluth, Minn., and Superior, Wis. It may fairly rank as one of the big plants of the country with a station output of a little more than 142,000,000 kw.-hr. The striking feature of the system is that fully half of the energy generated is delivered to a single electrochemical works, with which arrangements have been made that enable the whole surplus power to be delivered for this purpose. The company contracts after taking its guaranteed minimum of at least 1700 kw. continuous load to take all the available power. Its daily load factor varies from 82 per cent to as high as 93 per cent, making a most advantageously steady load. As the available flow varies from day to day the load dispatcher notifies the chemical company of the conditions so that the furnaces in use can be adjusted to the available power. In this way no water, up to the last limit of output of the station, is wasted and the chemical company gets the advantage of a cheap and plentiful supply which, with new storage arrangements, will be even more ample. It is a very striking example of the importance of electrochemical load in power-plant operation, and of the advantage that may be gained by those operating electrochemical works in locating where plenty of surplus power is available. The load factor attainable in this class of work is extraordinarily high, as is shown, for instance, in the operations of the Hydraulic Power Company of Niagara Falls, in which the utilization of a very large proportion of its power by electrochemical industries brings the yearly load factor up to the extraordinary point of 91 per cent. The Great Northern Power Company, in spite of the very miscellaneous load to which half of its power is applied, still passes the 50 per cent mark, thanks to this single large consumer. When one remembers that every cubic foot of water which runs over the spillway represents totally lost energy the importance of utilizing surplus water becomes self-evident, and electrochemical works probably give the very best chance of doing this on a large scale.

The transmission plant of the Great Northern Company includes some features of more than usual interest. The transmission is a comparatively short one, about 15 miles, at 33,000 volts and practically all the lines are now in duplicate and run in closed loops, so

that the load can be supplied in either direction. Even the customers in Superior, who were originally taken care of by a submarine cable across the bay from Duluth, now have the advantage of an independent line in addition. In fact, the overhead lines are insulated for 66,000 volts in case it should be desirable to raise the voltage later, so that the operative factors of safety are extremely large. Care particularly has been taken in running the branch circuits to insure the highest possible continuity of service. At one point about half way from the power house where it has been necessary to take off a branch on the service of the Minnesota Steel Company, a complete loop has been thrown out to the customer which can be operated as a part of either of the main transmission lines, so that there is no branch in the proper sense established at all, thereby avoiding the sometimes serious troubles which arise at such a discontinuity in the electro-dynamics of the system. Incidentally the necessary connections are made at an outdoor switching station, the installation of which in the severe climate of Minnesota ought to yield some encouragement to the timid contingent of engineers who are unhappy unless all the apparatus in sight is carefully housed regardless of expense.

Co-operative Credits for Local Contractors and Dealers

AN article on another page calls attention to the problem of slow pay. The suggestion is made that jobber, contractor and central station get together and devise ways to handle the slow-pay customer in the local community. Another phase of the subject, although from a different angle, is reflected in the article on how the local bank may finance part-time payment plans for house-wiring. Local credits are always an interesting question. The average laundry man in a small town can tell you the town's credit history from his own accounts. A more definite plan in which central station and contractor may co-operate is that developed in some Mid-Western towns where all the local merchants, and they include the electrical dealers, exchange credit information of the community by a simple system operated by the secretary of the business association. A blank form is sent to each merchant asking him to list and key the name of his customers as to whether they are cash, good pay, slow pay or poor pay. The grocer, the coal man, the butcher and the electrical dealer each sends his list of names to the secretary, who establishes from these individual ratings the average credit standing of each customer in the town and returns it to each association member. This plan is practical, and should afford a basis for determining the terms on which the local dealer would be justified in making his sales to the townspeople.

Sphere-Gap Measurements of High Voltages

UNTIL a few years ago, the needle gap was the only available device for estimating high-tension spark voltages. The needle gap, however, was unsatisfactory and not very accurate, owing to the difficulty of obtaining needles with precisely the same degree of sharpness in their points. It was found that the degree of sharpness exercised a very appreciable effect on the spark distance. Later on, the sphere gap was introduced, and has shown itself to have distinct advantages over the needle gap; besides lending itself more readily to computation.

In the article which appeared on page 649, last week, R. H. Marvin cited some interesting observations tending to show that a small layer of fine dust particles on the opposed metallic surfaces of a sphere gap was capable of causing it to spark over at unduly low voltages; although the spark discharge seemed to burn off the dust, and restore, after a time, more normal surface conditions. This tendency of a sphere gap to discharge at too low a voltage has not, we think, been previously pointed out in publications; but it is not surprising if such an effect is produced by dust. Any local irregularity which tends to distort the electric stress at the gap surfaces is likely to weaken the air locally and precipitate an early discharge.

The sphere gap is now a recognized measuring device in the standardization rules of the American Institute of Electrical Engineers. An objection to the use of this device, for high voltages, is its large size and clumsiness. When the emf. to be measured exceeds 240 kv. r.m.s., the use of two half-meter diameter spheres is called for. The mere dimensions of this construction require a floor space of 100 x 50 cm., without any allowance either for the gap or the large clearance that must be provided on all sides. It is so difficult to measure a spark emf. of say half a megavolt crest value, that we may be only glad that the sphere gap is available, and we should not perhaps look askance at a boon of this type; even though it adds appreciably to the ground rent. Nevertheless, one may well be excused for wishing that the device were a little less structural in its proportions. Mr. Marvin's article concisely calls attention to the technique required in its use.

The Coming Issues

THE issue now in the hands of the reader is the commercial number for March, in which following the usual plan for the fourth issue of the month, particular emphasis is placed on commercial topics of interest to the central station, contractor, dealer, jobber and manufacturer. Next week, in the first or public-relations number of April, a leading article will take up the subject of the returns received by the community from public-utility operation. "Service Requirements for Electric Furnace Operation" will be the title of another timely article. In the station-operating issue of April 8, methods of operation and inspection of a metropolitan boiler plant will be discussed, and there will also be presented a symposium of experience on the engineering considerations involved in the use of substitutes for copper for transmission lines carrying small loads.

Chronicle of Events of the Industry and of Important Movements in the Field

NEWS OF THE WEEK

Reports of Conventions and Meetings of Electrical Associations and Societies

Myers Water-Power Bill Sidetracked

The Myers water-power bill lost its place as the unfinished business on the Senate calendar Wednesday, and it is problematical when it will again come up. President Wilson has had a number of conferences with Senators in regard to the water-power situation, and the impression grows that no water-power legislation will be passed at this session of Congress which does not meet with President Wilson's approval. As forecasted by the Washington correspondents of the ELECTRICAL WORLD last week, the Shields water-power bill has met with no approval in the House of Representatives, so far as the House committee in charge of it is concerned. This committee, which is the House interstate commerce committee, has now drafted a new bill, and has voted to substitute it for the Shields bill which was passed by the Senate.

President Wilson's conferences were held with Senators Myers, Kern, James, Stone, Swanson, Walsh and Martin. It is believed in Washington that an entire new water-power bill may be produced simultaneously in the Senate and the House. It is presumed in Washington that if the President interests himself in the matter of water-power legislation he may be able to have a bill passed which will meet the widely divergent views of those who are anxious to bring about some legislation. The best information obtainable is that the President intends to do this, and that before taking a positive stand he will await advice which he expects to receive from the new Secretary of War, Mr. Baker.

Public Service Commission Indorses Rate Reductions by Legislation

The Public Service Commission of New York, First District, took action Tuesday to hasten the reduction of the price of gas for at least 60,000 consumers in Brooklyn and Queens. Oscar S. Straus, as Chairman, telegraphed to Albany in the name of the commission in favor of the Lawson-Burr bill, which would extend the 80-cent gas law to those wards in Brooklyn and Queens which were not included in the original 80-cent gas law of 1906.

A joint hearing of the Senate and Assembly committees was held Wednesday on the gas bills, and it was on account of this that Chairman Straus sent last night this telegram:

March 21, 1916.

Hon. George F. Thompson, Chairman Public Service Committee, the Senate, Albany, N. Y.:

Hon. William C. Baxter, Chairman, Electricity, Gas and Water Supply, the Assembly Chamber, Albany, N. Y.:

I am informed that a hearing will be held to-morrow before a joint committee of the Legislature on proposed legislation to reduce the rate of gas in certain wards of Brooklyn and Queens to 80 cents.

There are several cases which have been before this commission for a long time affecting rates in these wards. In view of the circumstances surrounding these cases, the commission would look with favor upon such legislation, provided it can be had in justice to all interests concerned. That is, this commission wishes it to be understood as not interposing any objection to action by the Legislature which will secure to the people of these sections reductions in rates that have been delayed by the technical provisions of the law as it stands.

This commission intends shortly to submit bills proposing amendments that will expedite the making and enforcement of decisions. OSCAR S. STRAUS,

Chairman Public Service Commission.

The sections of Brooklyn which would be benefited by the Lawson-Burr bill are the Thirtieth Ward, or Bay Ridge, where the Kings County Lighting Company charges 95 cents a 1000 ft., and the Thirty-first Ward, or Coney Island, where the charge is $1 a thousand. In Queens the Second Ward would have the $1 charged by the Newtown Gas Company cut down. The consumers of the Kings County concern numbered in 1913, 24,521, and the customers of the Newtown Company 35,330.

The commission has been investigating complaints concerning these rates for a number of years, and has already taken all the testimony it needs. The great mass of this, however, was taken by commissioners who are no longer on the board. The Kings County Lighting Company case was begun in October, 1910, and the Newtown Company case in January, 1913.

Sale of Water Power Developments at Sault Ste. Marie

The Great Lakes Power Company, Ltd., a recently-formed corporation, has purchased the entire water-power development and water-power rights at Sault Ste. Marie, Ont., from the Algoma Steel Company. At present 12,000 hp. is sold as water power and a 6000-hp. hydroelectric development is in operation. The ultimate rating of the development is about 48,000 hp.

In addition to the power rights the Great Lakes Power Company, Ltd., also bought the street railway system, which has about 7 miles of track, and the International Ferry, operating between the customs houses of the United States and the Canadian Governments. James O. Heyworth, engineer and contractor, 606 South Michigan Avenue, Chicago, negotiated the sale for the Great Lakes Power Company, Ltd.

Co-operative Plan for Selling Electric Ranges in Seattle

The Puget Sound Traction Light & Power Company has developed a plan whereby it can offer to the leading manufacturers, without unduly favoring any one firm, a co-operative method for selling electric ranges. The plan assumes that a stock of each manufacturer's ranges will be carried by a local jobber who will resell to the central-station company and will otherwise act as the manufacturer's agent. The employment and direction of the salesmen, however, will be done by the central-station company, as will also the working out of the sales campaign details.

The plan provides for the employment of four salesmen to represent each manufacturer's product exclusively. These men will receive a commission of 10 per

cent of the net price on each range sold, and will be guaranteed a minimum of $75 per month. The deficit, if any, between the monthly commission totals and the seventy-five-dollar minimum is to be split evenly between the central station and the manufacturer. The salesmen will be provided with lists of prospective customers who have expressed preference for a particular make of range, but salesmen will also be expected to develop "prospects" on their own account.

It is understood that a certain amount of general advertising will be done by the manufacturer, and that the central station will carry on an advertising campaign and will furnish all necessary facilities for suitable demonstrations, etc. Under this plan it is believed that there can be no question as to the fairness of representing each manufacturer's product. Nor will the jobber, dealer and contractor be excluded because the same 10 per cent commission is to be allowed to all of these. It is expected that under present conditions in the Seattle territory a good range salesman will be able to make between $125 and $150 per month in commissions when working with such co-operation as the central-station company plans.

This plan has appealed favorably to the manufacturers, two of whom have already subscribed to the proposition, and a sales force will accordingly be put in the field on April 1. The company's interests in the campaign are being handled by H. J. Gille, sales manager.

Wire-Your-Home Month in Progress

The spring house-wiring drive which started on March 15, and which is officially known as "Wire-Your-Home Month," proposed and put in motion by the Society for Electrical Development, is receiving active support from all parts of the country. While most of the central stations and contractors who are taking advantage of the campaign started with the official beginning—March 15—a number of others have signified their intention of postponing their activity in this direction until the first of April.

Since at this writing the campaign has been in active progress but a week no details of actual results are as yet available, although so far as it was possible to learn the initial conditions augured well for the success of the movement. All of those who are actively co-operating with the society, manufacturers, jobbers and societies, report an unexpected demand for advertising and educational material. The National Electric Light Association, which is lending its assistance, has been unable to supply the demand for its house-wiring booklet, although it has already distributed some 135,000 of them. It has had to refuse orders by the thousands, and one very prominent generating company in the East that supplies a very wide territory said that the only drawback it had experienced was its inability to procure a sufficient supply of the association's booklets.

Owing to the inability to learn of any tangible results at the time of writing, it is not known to what extent, if any, the present high prices of wiring supplies, labor and fixtures will impede the campaign. A preliminary survey of the county, however, brought out many opinions that because of the advanced costs the success of the campaign might not be as great as anticipated.

While it was expected when the plans were first laid that the majority of those who participated in the campaign would during the month make a special concession in house-wiring prices, it is now known that because of the prices of wire, pipe, fixtures, labor, etc., many contractors and central stations have been forced to make considerable advances in their house-wiring schedules.

Overcoming Cold Weather Operating Conditions in Washington

The heavy storm in January, during which 3 ft. to 5 ft. of snow fell in many parts of the Pacific Power & Light Company's territory in Washington, imposed very severe conditions on many parts of the system. No transmission lines went down, however, and the damage was very slight.

The chief difficulty was the blockade of the canals caused by the heavy fall of snow. The Naches Canal near North Yakima, Wash., for example had to be partially cleared by hand of a 4-ft. depth of snow and ice for about 1000 ft. of its length. A washout of the canal at one point caused by overflows due to ice jams also prevented the use of the channel for a few days.

The accompanying illustration shows the method that had to be used in opening a channel. About seventy-five men in hip boots waded into the canal and attacked the snow with shovels. Some of the force had to be withdrawn from time to time to other work on the canal, but a channel for the entire length of 1000 ft. was cleared within about two and a half days, and after this the remainder of the snow and ice gradually was worked out by the water as it rose to its normal depth in the canal of about 5.5 ft. The canal in the section where the trouble occurred is 12 ft. wide on the bottom and has 1 to 1 slopes. Dynamite was used to clear the ice from the waterways at several points.

REMOVING SNOW FROM NACHES CANAL

National Safety Exposition in New York

Preparations are nearly complete for the opening of the Third National Exposition of Safety and Sanitation in New York City in May. It will be held under the auspices of the American Museum of Safety and will open its doors on May 22 continuing through to May 27. The exposition was originally scheduled for April.

"The safety exposition has become a permanent institution in our country," says President Arthur Williams of the American Museum of Safety. "The splendid results shown by the previous safety expositions have demonstrated that a much greater interest in safety and sanitation was aroused. It is a lasting incentive to safety endeavors. Under the stress of competition offered by the exposition, improvements are sought and put into practice, inventions made, new methods devised, greater care taken and new standards set. After all, preparedness in America should begin in our industries; keeping our workingmen fit and whole and sound, the men who must do the defending when the time for defense comes, is of the greatest importance."

Supply Manufacturers Celebrate

Completion of First Year's Work Shows Organization to Be in Excellent Condition and Full of Promise

On Thursday, March 16, the Associated Manufacturers of Electric Supplies held their annual meeting at the Hotel Biltmore, New York. The report of the secretary showed the organization to be in excellent working condition, and the chairmen of various sections attested to the value of the organization to them as manufacturers of supplies. R. K. Sheppard, who guided the association through its period of organization, was asked to continue to direct its affairs during

R. K. SHEPPARD
Who Has Been Re-elected President of the Associated Manufacturers of Electrical Supplies

the coming year. In addition, new members were elected to the board of governors as follows: For three years, Messrs. LeRoy Clark of the Safety Insulated Wire & Cable Company, New York; J. W. Perry of the H. W. Johns-Manville Company, New York; W. C. Robinson of the National Metal Molding Company, Pittsburgh; J. J. Gibson of the Westinghouse Electric & Manufacturing Company, Pittsburgh, and Warren Ripple of the George Cutter Company, South Bend, Ind. For two years, Messrs. E. B. Hatch of the Johns-Pratt Company, Hartford, Conn., and L. W. Downes of the D. & W. Fuse Company, Providence, R. I. The new officers are R. K. Sheppard of Boston, president; H. B. Crouse of the Crouse-Hinds Company, Syracuse, N. Y., vice-president; J. W. Perry of New York, treasurer, and Charles E. Dustin, general secretary.

In his presidential address, which formed the chief feature of the meeting, R. K. Sheppard traced the growth of the organization and dwelt on those causes which brought it into being. He said that in the winter of 1914-15 American manufacturers of electrical supplies and materials entering into electrical construction found the need of one another.

"Suddenly we discovered that most of the modern world and certainly every other division of the electrical fraternity in this country had far outstripped us in that they had discerned and partially used the power of industrial solidarity. They had built powerful organizations, which co-ordinated their activities and compelled respectful consideration of their standard by all who dealt with them. We awoke. This association is a result of our awakening.

"Unique among such organizations it provides for every member one or more jobs in which he can coin his own abundant compensation for effort expended. With an unprecedented variety of detail interest represented by our members, every manufacturer of electrical supplies may fraternize here with his own particular group in an autonomous section. And still we preserve the power of our members in our federation of sections, the parent association, which aids and encourages the independent work of the sections and yet restrains us all well within the lawful limits."

Referring to the call for the first meeting to consider what action manufacturers should take with reference to the concentric wiring propaganda, Mr. Sheppard said never before in all the history of the electrical industry had the manufacturers of electrical supplies sat down in conference together. "Our lack of leadership and our need of the machinery for concerted action and united pronouncement on matters of great common interest were appalling. In those days we demanded action. What if we were hysterical and frightened by our uncontrolled imaginings? We acknowledge it. But we rejoice that out of that excitement sprang this powerful association sought at first, it is true, as a protection and only later disclosing its potentiality as a medium for constructive work of a higher order."

Mr. Sheppard said that it was soon realized that the Electric Power Club, the Associated Manufacturers of Electrical Supplies and the Electrical Manufacturers Club should co-ordinate their activities so as to avoid duplication and also to foster a lively, sympathetic and co-operative interest in the activities of each. A simple and useful medium of intercommunication for these three organizations has now been provided in the Electrical Manufacturers' Council.

MEMBERSHIP IN SECTIONS

From the report of the general secretary it appears that the membership of the association on June 1, 1915, numbered 91, while the present number of member companies is 143, and the executive and associate representatives total 215. There are now ten sections in active operation; the fuse section, interior conduit section, knife switch section, lamp receptacle and socket section, molded or formed insulation section, outlet box section, panelboard and switchboard section, porcelain section, snap switch section, wire and cable section. In addition, several new sections are in process of formation, embracing heating and energy consuming devices, electrical fixtures, fan motors and other lines.

The intention is to make the work of each section as valuable as possible to the manufacturers engaged in the branch of industry which it represents, and just as the association is open to all manufacturers of electrical supplies, and of material entering into electrical construction, so each section is open to all members of the association interested in its particular work.

The relations of the association and its sections with the Underwriters' Laboratories, Inc., are close, and in six sections representative members have already been delegated to serve in industry conference committees to consider questions of standardization, etc., affecting the branches of the industry which such committees respectively represent.

Brief reports were made for the various sections as follows: by LeRoy Clark for the wire and cable section, by C. Eidlitz for the panelboard and switchboard section, by J. Trumbull for the knife switch section and by D. H. Murphy for the electrical manufacturers' council. In addition, T. M. Debevoise, the general counsel of the association, outlined how the legal department might best be used by the members. It was decided to arrange for permanent headquarters somewhere in the vicinity of the uptown railroad station and to provide more adequately for association routine work.

In the evening a banquet was held at Delmonico's, which was very well attended. Dr. Talcott Williams of Columbia University and Counsellor J. A. Emery of the National Manufacturers Association spoke on the need of industrial preparedness.

Taxation and Issuance of Securities

Wisconsin Utility Representatives Discuss Service Rates and Relations of Government, Commission and Public Utility at Meeting of Wisconsin Electrical Association

Whenever legislation has occurred which is detrimental to privately-owned public utilities it has usually been the result of misconception of the actual conditions on the part of the Legislature, pointed out M. C. Ewing in making his presidential address before the Wisconsin Electrical Association at its convention in Milwaukee on March 16. Oftentimes these misconceptions have been purposely caused by propaganda organized to assist the confiscation of public-utility properties without due compensation. The most effective manner of combating such piracy in any community, declared the speaker, is to furnish the local Legislature with reliable, truthful and conservative facts so that opinions of the members will not be biased by hearsay. Regret was expressed at the continued acquisition of private plants through condemnation by various municipalities in Wisconsin, since this is one indication that regulation of monopolies is not proving satisfactory in all cases. Again, regulatory bodies appear to lose public favor as soon as they cease to enforce rate reductions, improvements in service, or otherwise fail to comply with popular demands. This condition should not exist, however, since there are limits beyond which it is uneconomical and even unprofitable for central stations to go.

ATTITUDE OF WISCONSIN COMMISSION ON SECURITY ISSUES

Following the report of the secretary-treasurer papers were presented by John B. Sanborn, Madison, Wis., and Harold L. Geisse, secretary of the Railroad Commission of Wisconsin, on "A Review of State (Wis.) Legislation During the Past Session" and on "The Attitude of the Wisconsin Railroad Commission on Security Issues" respectively.

The author of the last-mentioned paper pointed out that while it is frequently charged that security regulation retards development, the Wisconsin commission has endeavored to aid well-chosen enterprises controlling the issuance of securities only to the extent of keeping the companies' activities within the law. If the "cream is off the public utility business" it is because the days of exploitations have passed and the era of honest development has arrived. Although many persons have the impression that a commission has almost unlimited power in preventing the issuance of securities if it sees fit, the speaker pointed out its function in this matter is merely to require the corporate management to show a legal right to finance itself by issuing securities. Attention was also called to the fact that authorization of security issues is not necessarily a State guarantee of their safety.

In commenting on the difficulty sometimes experienced in determining the sequence of security issues, Mr. Geisse explained that the Wisconsin law requires every company desiring to issue securities to file a sworn application with the commission stating the purpose for which the securities or proceeds therefrom will be used. Upon due proof a certificate permitting the issuance is granted. If the securities are to be exchanged for property, the value of the property must be stated in the certificate and must be recorded on the company's books. This procedure increases public confidence in the securities, and presumably increases their marketability.

In passing upon an application for the authorization of a security issue a commission must have a certain amount of "intuition, knack or horse-sense," coupled with a knowledge of the physical property, its type, condition and value. The latter information is secured through the engineering department, but the former must be acquired by experience. If a company makes an application for authority to issue bonds it is advisable to inquire into the terms of the mortgage, the percentage of the amount expended for additions and betterments that the company is allowed to take down bonds to cover, and the amount of earnings required before a requisition upon the trustee for bonds will be honored. Consideration should also be given to the ability of the utility to market the securities at a warrantable price. Furthermore, it is advisable to investigate whether a certificate of public convenience and necessity has been secured before authorizing the issuance of stocks, otherwise some innocent purchasers of securities may be the losers if the promoters fail to show reasons for securing a certificate. At the same time a commission should require the promoters to prove their ability to secure funds to defray the cost of construction. The personnel of a management, its effiicency, relations with public and general policy should also bear weight with a commission in authorizing security issues.

Since bonds are a direct lien on the property of a corporation whereas stock is a lien on the assets that remain after the liabilities of the company are satisfied, there would be less danger to investors if stock is issued at a discount than if bonds are, provided it is necessary to issue either one below par value. In closing Mr. Geisse suggested that it would be advisable for commissions to definitely limit the minimum percentage of par value at which securities are issued.

In discussing the subject of Mr. Geisse's paper, F. M. Walker, general manager of the Milwaukee Northern Railway Company, declared that stock financing is handicapped by Wisconsin laws because rates and the issuing of securities are based on different values, and because stock cannot be sold below par value. The speaker also pointed out that with the present laws stockholders are led to believe that their investment has real representation in the value of the company, whereas it may have been used to finance new work, a part of which is service value and therefore has no real representation. Since there is no body to reimburse persons who engage in an undertaking that fails from no fault of theirs, it was contended that the profit on legitimate exploitation should not be limited. Mr. Walker expressed the belief that the public is not benefited by any activities which tend to discourage enterprises which might not be successful. On the other hand, the public is benefited by failures of promoters, since property is installed, service rendered and real-estate values enhanced.

In answer to Mr. Walker's objection that rates and security issues are not based on the same values, Mr. Geisse explained that there are distinctly fundamental economic reasons why they should not be. He also added that the lack of railroad development in Wisconsin is not due to limitations imposed by the commission, but to the general decline of railroad securities.

METHODS OF TAXATION OF PUBLIC SERVICE COMPANIES

Various elements which enter into the tax rate on Wisconsin public utilities, and the method by which the tax commission arrives at the value of the utility for taxation purposes were outlined by T. E. Lyons, member of the Wisconsin Tax Commission. The tax rate is determined by dividing the total amount to be raised by taxation by the total tax value of the entire State. This is done by the village boards, common councils, etc., the tax commission having no voice except in determining the taxable value of the utilities or other properties. Since the value of utilities cannot be estimated the same

as other properties, the commission, in evaluating the former, first considers the original investment in the system and then the "reproduction cost." It also takes into account the history of the company covering the stock and bond value receipts, gross and net incomes, etc., and the earnings capitalized on three and five year basis. It was pointed out that two properties comprising equipment of equal values may have different taxable values because of different earning powers.

On the morning of the second session of the convention H. W. Young, president of the Delta-Star Electric Company, presented a paper on "Outdoor Substations," illustrated by about sixty lantern slides, showing equipment for voltages ranging from 13,200 volts to 66,000 volts. He pointed out that such stations should be designed so they may be readily converted into higher-rated stations.

Rate-Making for Residence and Street-Lighting Service

Following this, A. C. Babson, manager Wisconsin Gas & Electric Company, Watertown, read a paper on "Rates for Residence Electric Service," in which were outlined the advantages and disadvantages of various forms of rates, particular consideration being given to one form having a demand factor based on the number of active rooms and a low energy charge of 2 cents per kilowatt-hour.

Among the persons who discussed this subject were C. H. Shaw, electrical engineer Sheboygan Railway & Light Company; S. B. Way, general manager of the Milwaukee Electric Railway & Light Company, and Egbert Douglas, Milwaukee.

Growth of Rural Extensions and Commission Ruling Thereon

As chairman of the committee on rural extensions W. E. Haseltine reported that, from the limited data he had been able to secure, there has been a general growth in this class of business during the year, the farmers' load factors have improved, the income from this business in the State has increased 44 per cent, and the average income was about 10 cents per kilowatt-hour. The average power rate to rural customers was reported to be 6.5 cents, which was lower than last year. There seems to be a tendency among the companies submitting data to make the farmer furnish his entire equipment except the meter. The Railroad Commission has ruled, he said, that a farmer can be made to pay for his line but not for the transformer. The speaker expressed the belief that it would be more satisfactory to cover the fixed charges by a minimum charge for service than to make the farmer pay for his installation.

Mr. Ewing stated that the Wausau (Wis.) Street Railroad Company has been experimenting with a plan of requiring a guaranteed annual revenue of 40 per cent of the cost of the line. Later, when others are connected to the same line, the guarantee will be correspondingly reduced.

In a paper entitled "The Telephone Company and the Electric Utility," H. O. Seymour, general manager Wisconsin Telephone Company, discussed joint use of poles by telephone and electric service companies, and the relations of the two in working together for safe construction. He pointed out that in spite of the great difference of opinion as to what should constitute safe construction the N. E. L. A. specifications are probably the most representative and most generally accepted.

The paper was discussed briefly by F. W. Walker and S. B. Way. In giving a brief review of the National Electrical Safety Code work, and an outline of the last tentative code published by the Bureau of Standards, Mr. Way criticised the complexity of both works, saying that it will be extremely hard to secure inforcement thereof.

To Investigate Relative Tax Burdens of Utilities and Industrial Concerns

Because of the feeling which prevailed at the convention, and was voiced by President Ewing, that the utilities of Wisconsin are forced to pay a much greater proportion of the taxes than industrial concerns, a motion was made and passed that a committee be appointed to investigate and report to the next convention

W. E. HASELTINE
President Wisconsin Electrical Association

the relative taxes paid by utilities and industrial concerns in Wisconsin, as compared with the same ratio in other States.

The following officers were elected for the ensuing year: President, W. E. Haseltine, secretary and general manager Ripon (Wis.) Light & Water Company; first vice-president, B. F. Lyons, vice-president and general manager Beloit (Wis.) Water, Gas & Electric Company; second vice-president, A. E. Pierce, vice-president Wisconsin-Minnesota Light & Power Company, Eau Claire; third vice-president, John St. John, secretary and treasurer Madison (Wis.) Gas & Electric Company; secretary-treasurer, George Allison, comptroller Clement C. Smith properties, Milwaukee.

Past Activities of President-Elect Haseltine

W. E. Haseltine, secretary and general manager of the Ripon (Wis.) Light & Water Company, newly-elected president of the Wisconsin Electrical Association, was born at Schofield, Wis., in 1874, and received his technical training in the Massachusetts Institute of Technology, where he studied chemical engineering. During the years of 1897 and 1898 he was engaged in civil engineering work on the White Pass & Yukon Railroad in Klondike, Alaska. In 1899 he and his father, C. P. Haseltine, who is president of the Ripon Light & Water Company, bought out the stockholders and acquired the property with which he is connected at present. At first Mr. Haseltine acted as secretary of the company, and later became its manager as well. During this time the company's electrical business increased about 400 per cent. Mr. Haseltine is also secretary and manager of the Markesan (Wis.) Electric Company, which is an operating company now engaged in constructing a transmission line from Ripon to Markesan to supply the latter with energy generated by the Ripon company. Mr. Hazeltine has been one of the active members of the Wisconsin association since its organization, and has served in executive positions for the past three years.

Uniform Load Approached by Bulk Supply

How the Great Northern Power Company Has Provided Extensive Water Storage and Arranged to Handle Large Industrial Demands

BY W. N. RYERSON
Chief Engineer Great Northern Power Company

THE net energy output of the Great Northern Power Company of Duluth, Minn., for 1909 was 62,809,020 kw.-hr. Since that time the demands on the system have increased until in 1915 the total metered output amounted to 119,771,176 kw.-hr. Accompanying this increase in load and a constantly improving diversity factor, a better load-factor has been secured which has made possible substantial reductions in rates. The company serves principally the communities of Duluth, Minn., and Superior, Wis.

It sells electrical energy directly only to large users, including the Duluth Edison Electric Company and the Superior Water, Light & Power Company, which retail to small customers with less than 50 hp. in motors. These communities, situated as they are at the head of fresh-water navigation, are the outlets for the grain, lumber, iron ore, copper and zinc products of the great Northwest, and claim within their corporate limits many steel and cement mills, grain elevators, flour mills, electrochemical plants and other large energy-consuming manufactories and industries.

Among the fifteen companies of this country reporting a station output for the year 1915, between 100,000,000 kw.-hr. and 200,000,000 kw.-hr. as listed in the March 11 issue of the ELECTRICAL WORLD, the Great Northern Power Company stands eighth. More than one-half the total energy sold was used by one electrochemical manufacturer and the bulk of the remainder was used by four groups of customers, as shown in the accompanying tabulation. During 1915 a larger number of contracts were signed for new business and the amount of estimated earnings therefrom is greater than for any two years heretofore.

During the year 1915 the following customers purchased energy as tabulated:

	Kw.-hr.
Coal docks	11,130,349
Duluth and Superior lighting companies	20,930,046
Duluth-Superior Traction Company	15,178,242
Duluth city pumping	5,058,480
Miscellaneous customers	7,156,452
Total	59,453,569
Electrochemical company	60,317,607
Total energy sold	119,771,176
Total output of station	142,249,020
Line, transformer and station losses	22,477,844
Losses in per cent of total energy generated	15.8

As indicated by the data of the above table, the electrochemical company, uses more energy than all the other customers combined, and it is this together with an unusual contract, which makes possible a very high load-factor. This company contracts to take all the surplus power the central-station company can furnish it; that is, the latter generates power continuously up to the flow of the river, supplying all that its various customers demand, and the chemical company takes the

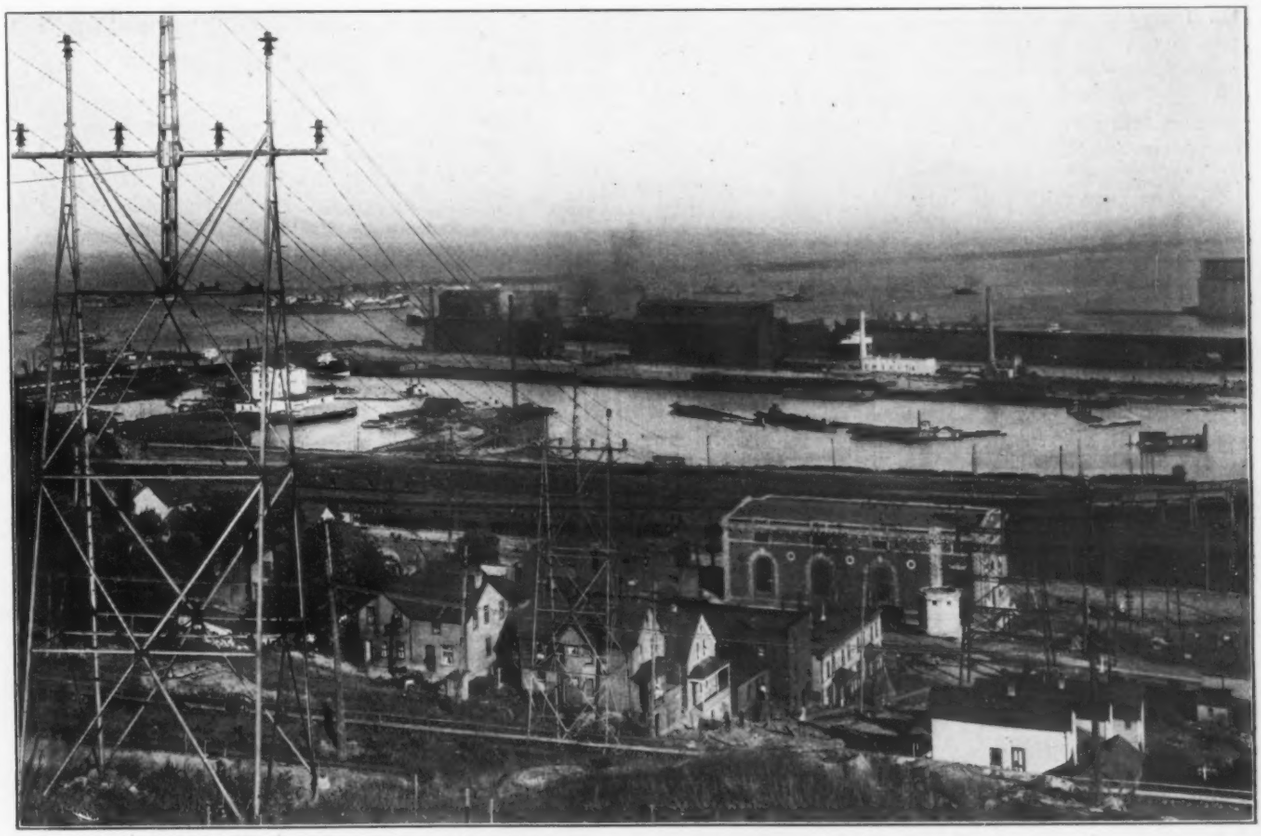


FIG. 1—THE DULUTH SUBSTATION IS SHOWN AT THE FOOT OF THE HILL CONNECTED TO A DOUBLE CIRCUIT STEEL TOWER LINE—COAL AND ORE DOCK ELEVATORS SERVED ARE SEEN IN THE BACKGROUND

remainder. As the flow of the river varies from day to day, the power company's load dispatcher calls up the chemical company and advises when to put on or take off the furnaces. The only concession to the chemical company is that it is guaranteed at least 1700 kw. continuous load. This company operates continuously and has a daily load-factor ranging between 82 and 93 per cent. The energy used by it is generated by the water which would otherwise be wasted over the spillway.

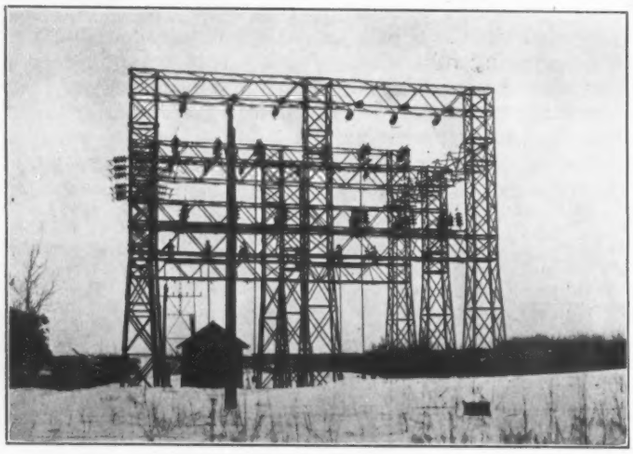


FIG. 2—STEEL TOWER SWITCHING STATION AT A JUNCTION OF BRANCH AND MAIN LINES

The contract is one with a give-and-take benefit, the chemical company securing a low rate and the power company an exceptionally high load-factor. On the generating station the daily load-factor averages more than 80 per cent, while the yearly load-factor is over 50 per cent. Another customer which will be an enormous power user when in full operation is the new Duluth plant of the Universal Portland Cement Company, which is purchasing energy on a guaranteed load-factor of 80 per cent. With a connected horsepower of 7320 and the plant running continuously, it is estimated that the yearly consumption of this plant will be 22,000,000 kw.-hr.

To keep pace with this substantial growth the company has increased the rating of its hydroelectrical station by the installation of a 12,000-kw. unit and provided greater water storage to carry its customers through a low-water period. The original installation included three 11,000-kw. turbine units operated under an effective head of 375 ft. This was furnished by a reinforced-concrete dam built across the bed of the St. Louis River at the headworks marked Thomson on the accompanying map. The spillway of this dam is 1200 ft. long and the gatehouse at one side opens into a 6000-ft. canal which leads down to the forebay with a dam at its head. From this three penstocks connected to a common surge tank of 400,000 gal. capacity, 30 ft. in diameter and 246.5 ft. high, with a pipe 6 ft. in diameter, carry the water to the power house. In addition to the reservoir situated at Thomson, there are dams at the outlets to Rice and Fish Lakes, forming storage reservoirs of 24 sq. mile ft. and 59 sq. mile ft. normal capacity respectively. Both of these lakes are north of Duluth and feed the Cloquet River, a tributary of the St. Louis River.

GROWTH OF WATER-STORAGE SYSTEM OF GREAT NORTHERN POWER COMPANY

At the time the 12,000-kw. unit was added to the power house another penstock was provided to supply it with water and all four penstocks were covered with earth. Provision was made for large future growth by the building of an earthwork dam with a concrete sluiceway at the outlet to Island Lake, already referred to above as north of the city of Duluth and feeding the Cloquet River. Along one low side of the lake a dike was constructed. This additional storage required the flooding of about 13,000 acres of land and added a reservoir of 192 sq. mile ft. to the system, bringing the total normal storage up to 7,666,540,000 cu. ft. Island Lake can be filled twice a year with the normal 30 in. of rainfall and run-off existing, but the other two storage lakes can be filled only once a year. Practically one-third of the area of the drainage basin is swamp and 36 per cent of the water precipitated in this area finds its way into the river at the power house. Over and above this already existing storage capacity, the company has surveyed and located further reservoirs in the district which would bring the total up to 950 sq. mile ft., permitting a continuous development of 45,000 hp.

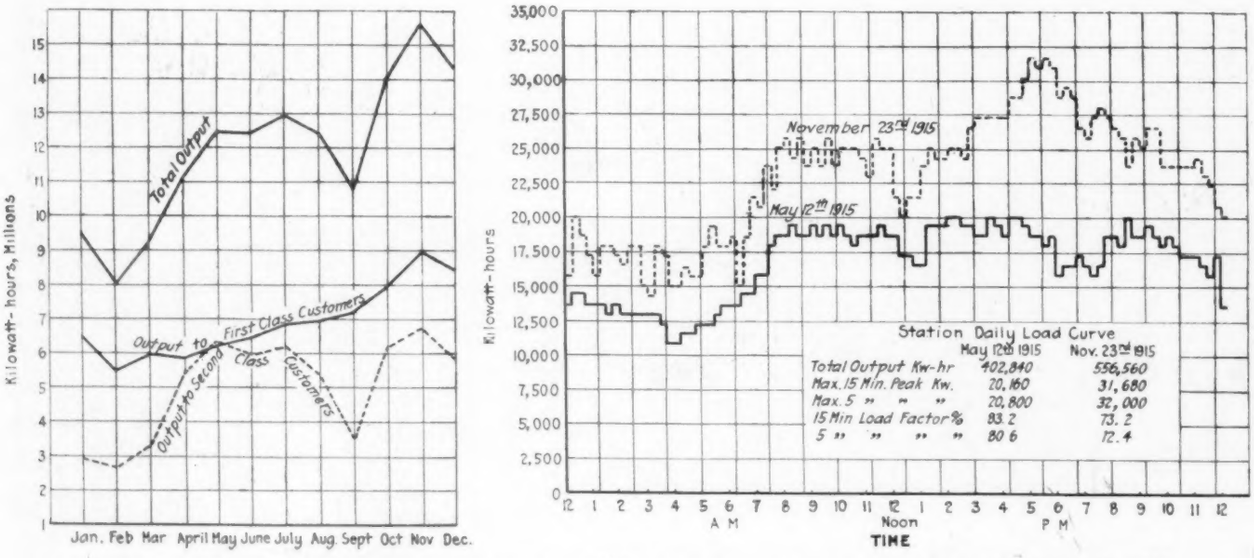

Kilowatt-hours, Millions
Total Output
Output to First Class Customers
Output to Second Class Customers
Jan. Feb Mar April May June July Aug. Sept Oct Nov Dec.
Kilowatt-hours
November 23rd 1915
May 12th 1915
Station Daily Load Curve
May 12th 1915 Nov. 23rd 1915
Total Output Kw-hr 402,840 556,560
Max. 15 Min. Peak Kw. 20,160 31,680
Max. 5 " " " 20,800 32,000
15 Min Load Factor % 83.2 73.2
5 " " " " 80.6 72.4
A M
Noon
P M
TIME

FIG. 3—POWER STATION OUTPUTS FOR MONTHS OF 1915 AND DAILY LOAD CURVES FOR MAY AND NOVEMBER, 1915

The first class customers referred to in the output curves are those having a practically constant load. The second class customers are those having a varying demand during the day, such as the utility companies served. The latter class are responsible for the peaks in the total output curve.

during minimum-flow years, 54,000 hp. during average-flow seasons, and 68,000 hp. during maximum-flow seasons according to past records. The natural river flow in 1915 was sufficient to generate 21,700 continuous horsepower.

EFFICIENCY OF THE SYSTEM

The efficiency of the power system is such that a flow of 1 cu. ft. per second will deliver 27.08 hp. at the low-tension busbars in the Duluth substation, which includes the hydraulic transmission and double transformer losses. The theoretical potential energy of a cubic foot of water per second in the forebay is 41.29 hp., while the actual measured average hydraulic efficiency of the plant is 70 per cent.

THE TRANSMISSION AND DISTRIBUTION SYSTEM

As the number of customers and the size of the load has increased, it has been necessary to install more and more safeguards against interruption of service, until now, as seen in Fig. 7, practically all of the circuits are run in duplicate and in closed loops, making it possible to serve nearly all industries from either direction. Originally the Superior customers were supplied from the Duluth substation by submarine cables across the bay. Later as a matter of precaution another 33,000-volt transmission line was built from the power house to the Logan Avenue substation in Superior, which was tied into the Superior circuits, thus completing a loop from the main energy supply to that city. The Logan Avenue substation, however, was designed only for sufficient equipment to carry the utility loads, it being simply an insurance investment.

The high-tension lines are operated at 33,000-volt pressure, which is stepped down in the Duluth and Logan Avenue substations to 13,200 volts for local distribution. The high-tension lines are insulated for 66,000 volts throughout to provide for the possible future economy of cutting down the line losses. The duplicate lines into Duluth are both carried on one line of steel towers, 14.5 miles from the power house at Thomson. The single Superior line, carried also on steel towers, is 15.25 miles long and is operated at 33,000-volt pressure.

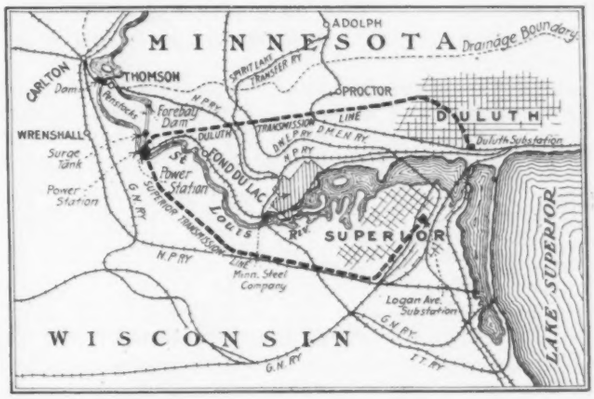


FIG. 4—MAP SHOWING LOCATION OF HYDROELECTRIC PLANT AND COURSE OF TRANSMISSION LINES

Separate transmission lines run to Duluth and Superior but are connected by submarine cables across the bay, thus permitting the delivery of energy from two directions and thereby minimizing the possibility of service interruptions.

ELIMINATING THE JUNCTION POINT OF BRANCH TRANSMISSION LINES

It has been the experience of many companies operating high-tension transmission lines that a very large part of the disturbances and interruptions to service occur at points where the branch lines are connected to

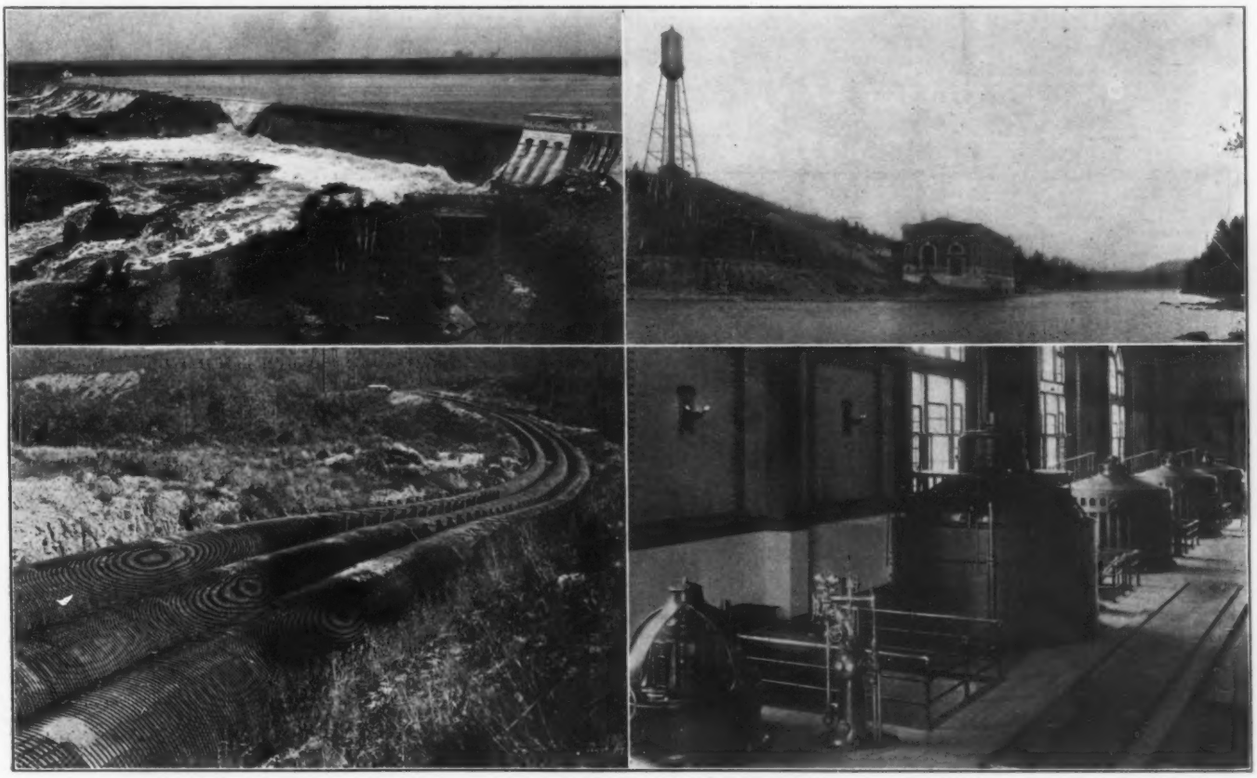


FIG. 5—DIVERTING DAM, PENSTOCKS AND SURGE TANK, EXTERIOR OF POWER HOUSE AND VERTICAL-TYPE 6600-VOLT GENERATORS

The reinforced-concrete dam shown stretches across the St. Louis River near Thomson and diverts water into a 6000-ft. canal leading to the station forebay. From this water is conveyed to the power house by four wood-stave hoop-bound penstocks (three of which are illustrated herewith) connected in common at the foot of an incline between the forebay and the station and again on the hill above the station by surge tanks. The generator shown in the foreground is a 12,000-kw. unit and the remaining machines are rated at 11,000-kw. Each operates on a 375-ft. effective head and generates 6600-volt energy.

the main line. The writer had considerable to do with this sort of trouble while with the Ontario Power Company, and devised a means of overcoming similar difficulties when it became necessary to build a branch line from the high-tension system to serve the Minnesota Steel Company's new plant at Duluth with power. The line and switching arrangements are shown in the diagrams of Fig. 6.

The duplicate transmission lines carried on the same poles between the power house and Duluth were intercepted at a point about 7 miles from the power house and at an extremely inaccessible place, which made it

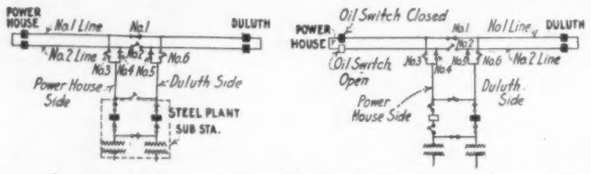


FIG. 6—CONNECTIONS FOR BRANCH LINE SERVING A STEEL PLANT

Under normal operation No. 2 line as shown in the diagram at the left is looped through the substation at the steel plant. When the power station end of line No. 2 is out of service or the power station side of the steel plant loop is out of service, the steel plant substation is tapped on the Duluth end of line No. 2 as shown in the diagram at the right. These diagrams are furnished station operators as directions in handling line trouble.

especially important that this should not be a point of trouble. An outdoor switching station was built at this point with the six General Electric type LG-9 70,000-volt, 400-amp. switches mounted on a steel framework. Two of these switches are in the main transmission lines. Under normal operation one of them (No. 2 switch in No. 2 line of Fig. 6) is open, while No. 4 and No. 5 switches are closed. Thus the power delivered to Duluth over No. 2 line is taken through the steel plant substation loop, thereby making the branch line a part of the main line. The six switches installed make possible the operation of the steel-plant loop in either line, or any one of a large number of other connection combinations to take care of almost any possible emergency in supplying continuous power to the steel plant and to Duluth.

METHOD OF ISSUING SWITCHING INSTRUCTIONS TO OPERATORS

In issuing instructions to the station operators the company has drawn up some thirty sheets, like those in Fig. 6, showing as many different connections of the switches to provide for specific troubles. Each of the drawings, which are made of such size that they will fit the operator's instruction books, lists all possible trouble and shows the position of the switches to take care of the situation. This is the company's regular routine way of issuing instructions, since it believes that a picture tells more and stays in the mind of the operator better than long written instructions. In Fig. 6 an example is given of how these instruction drawings specify the connection, when possible, which makes all the lines in service a part of the main line, rather than to have any part of them a branch line, as would have been the case if No. 6 switch had been closed instead of No. 5, in a diagram of switching connections mentioned and shown at the right hand side of Fig. 6.

Classification of A.C. Motors

Delay in securing proofs in time for this week's issue of the ELECTRICAL WORLD makes it impossible to present the closure of the discussion on nomenclature of altering current motors. A final summary will be presented in a later issue.

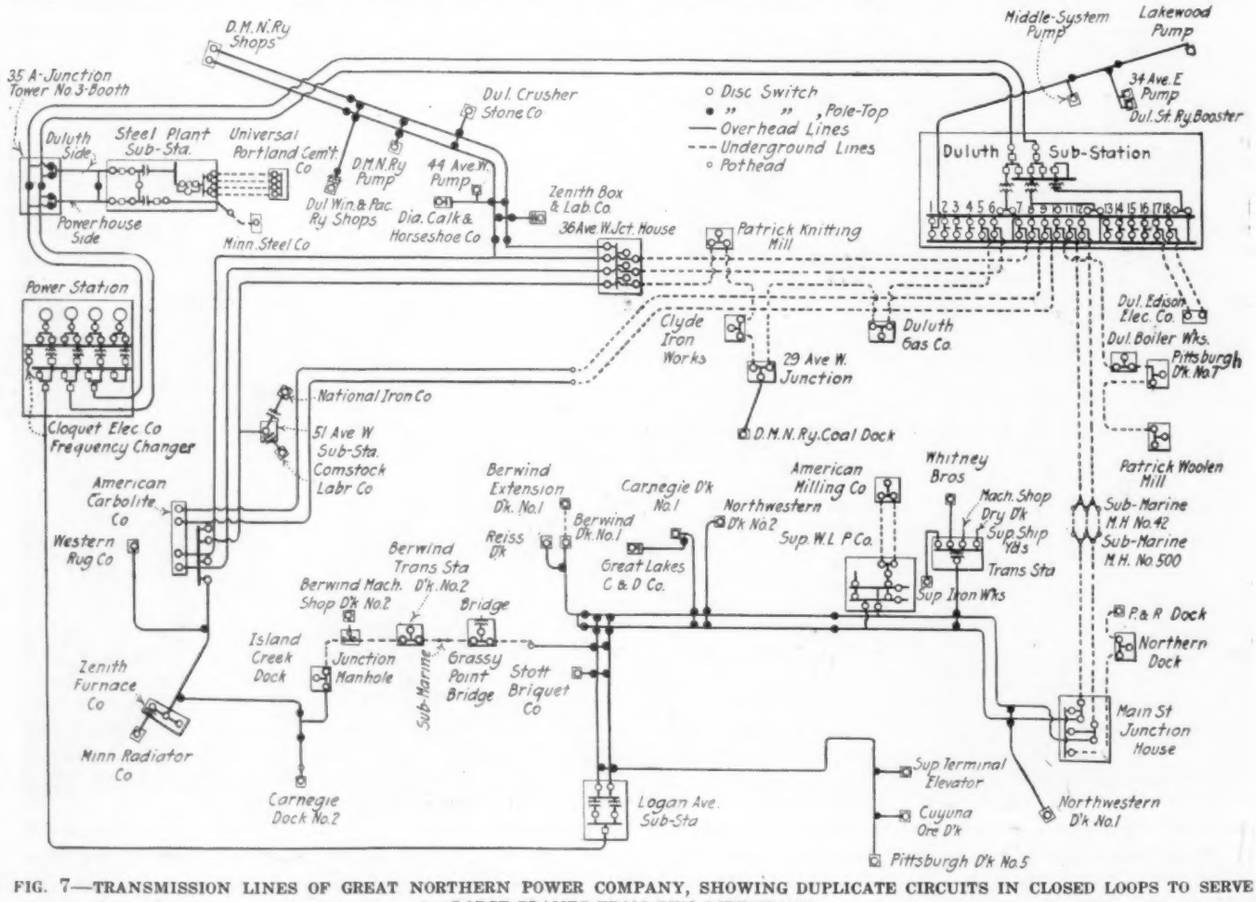


FIG. 7—TRANSMISSION LINES OF GREAT NORTHERN POWER COMPANY, SHOWING DUPLICATE CIRCUITS IN CLOSED LOOPS TO SERVE LARGE PLANTS FROM TWO DIRECTIONS

Beyond the Wire-Your-Home Month Campaign

"What Will You Do to Bring Its Half-Grown Profits to Maturity?" Is the Question to Which Contractors and Central Stations Have Now to Find an Answer

IT is important that every contractor and central station should consider now and carefully what shall be done when April 15 has been passed and the "Wire-Your-Home Month" campaign is over. For it is a marvel of our market that no concentrated selling effort ever is concluded without having really formed another and as great an opportunity new-created by induction. In other words, the influence of a campaign awakens much fast-developing desire that does not crystallize within the campaign period but can be turned to no-less profitable business later and must not be suffered to subside.

The "Wire-Your-Home Month" campaign will wield a mighty influence for the winning of old houses to the service in every city where the electrical men unite their power and apply it in this burst of educational and selling effort. For the psychology of such a campaign is potent. It upbuilds a high degree of irresistible enthusiasm among the workers. It seizes upon the popular attention and makes its message heard and understood by every householder. The element of bargain is injected by the offer of some special inducement, either in the price, the terms of payment or other conditions of the campaign contract, and intensifies the natural appeal. And then by setting a time limit on the offer, people are impelled to action and persuaded to "buy now" and save the extra money it will cost them to defer this action which they ultimately intend to take. It is just these considerations that have made the "Wire-Your-Home Month" idea appeal so universally, and have brought such eager and confident responses from every branch of the industry. But, after all, experience has proved that though the "whirlwind campaign" by its high potential can achieve results impossible at other times, it is the steady year-round habit of production that produces the greater volume.

The men who annually ride the six-day bicycle race in Madison Square Garden are always teams of two, a "sprinter" and a "plugger." Without the "sprinter" to make the unexpected and spectacular gains, the "plugger" could not hope to win the race or bid for popularity, but without the "plugger" to maintain the lead and make each hour resultful, to the same degree the "sprinter" could not figure in the contest. It is a combination of this kind that makes the distance and maintains the pace. Here are the elements that are essential in the selling campaign. It is therefore time for every man concerned to think upon the things that he will do when he has brought his "Wire-Your-Home Month" campaign to a successful end. How will he protect himself against the loss of position gained by the burst of speed?

It is an easy thing for a man behind a campaign to lose sight of what in truth is the actual underlying purpose of his effort. It is a campaign, he will say, to win house-wiring contracts. But he is wrong. The contract is the final evidence of his success, unquestionably, but back of that his purpose is to influence men and women to the desire to have their houses wired. By all the clever sales devices of a campaign he will strive to make them come to quick decision and sign contracts within the period prescribed, but there will still be many well-developed "prospects" who procrastinate beyond that date and yet are very worthy the bringing in. So the product of a campaign cannot be measured by the contracts signed within the actual campaign. Much of the fruit of such an effort will ripen slowly, and must either be gathered later or lost. Behind the "Wire-Your-Home Month" must be a plan for prolonged, consistent selling that will bring in the full value of the intensive work that has gone before. Those who had almost decided to sign when the campaign closed must be sought out. The people who had been finally awakened by the impulse of the campaign and set to thinking must be developed. Half-grown profits must not be lost. Every seed that has begun to grow must be cultivated, brought to maturity and safely harvested.

The details of several such sustained campaigns successful in New England, follow in this issue, together with an account of the interesting financing plan worked out in Cleveland. Other plans for continuous production that have been evolved in Western cities will be presented in the numbers to come.

The Permanent House-Wiring Campaign and Survey of the Boston Edison Company

THE Edison Electric Illuminating Company of Boston entered upon a systematic house-wiring plan in October, 1913. In the twenty-eight months to March 1, 1916, 3196 contracts had been closed for the wiring of houses and apartment buildings. These installations represent 63,940 50-watt equivalents, or 3197 kw., an average of 1 kw. per contract.

The total wiring expense was $277,845, an average of $86.94 per contract, the minimum being $14.35 and the maximum $600.00. The estimated income from these new services is $75,234 per year.

This house-wiring campaign is a permanent institution, with no limit of time to which it will run. The business which it seeks covers all existing houses on Edison lines. Contracts are turned over to contractors at the same prices for which they are taken, about 150 contracting firms sharing in the business. The minimum price of $14.35 provides for one outlet, consisting of a flush-plug receptacle placed in any room on the first floor. An outlet in the cellar adds $4.65; an outlet on piazza with switch in hall and fixture costs $7.65 additional; for two outlets, with parlor switch and fixture, the price is $25.50, and the following additions apply after the twenty-two-dollar rate for one room, hall and piazza outlets: Dining room, $12; kitchen, $8.25; pantry, $4.25; china closet, $4.25; back porch, $8; upper hall with two three-way switches, $11.25; bathroom, $8.25; all other outlets with fixtures, $4.25 each; switches, baseboard receptacles and bell-ringing transformers, $4 each.

On completion of the work, the company pays the contractor's bill in full and allows the customer to pay it in monthly installments, on the following basis: For monthly payments amounting to $2 to $2.99, twelve months; $3 to $3.99, fifteen months; $4 to $4.99, eighteen months, and $5 and over, twenty months.

The Boston Edison Company has a similar arrangement for the wiring of stores. This campaign began in November, 1913, and to date the following are the results: 2787 contracts, 42,304 50-watt equivalents (2115 kw.); total wiring cost, $70,663; estimated income, $142,654 per year.

The wiring of *new* houses is left entirely to the contractors, except that the Edison company keeps in close touch with progress of all building, seeing to it that all

new houses, stores and factories are wired for electric service. Permits for construction and building records are consulted, and local agents at the company's sixteen stores interview property owners and make sure they are providing for wiring their premises. If the local man fails, a special canvasser is sent out from the head office with instructions to "get the building wired."

This spring the advertising department is featuring house-wiring in its publicity. Weekly newspapers throughout the territory, about fifty in all, carry large display advertisements, and 5-in. and 6-in. double-column spaces are used in the Boston dailies once each week. A series of seven booklets is being mailed, one every three weeks, closing with a complete set to the same people, so as to cover the ground again, in the nature of a review. The list embraces 25,000 owners, landlords and tenants, householders' names being secured from assessors' books and checked up with the company's customer lists. The booklets, which were

WHAT PEOPLE SAY

Who Have Put in Electric Lights on the Edison Easy-Payment House Wiring Plan:

NEWTON.
"My tenant, who had used electricity before, demanded it here, and now has extended his lease."

NEWTON.
"It is all you claim for it, and most excellent in every respect."

NEWTON.
"We have found your service satisfactory in every particular under the Easy Payment Plan. When we decided to wire our house (in Waban) it was our intention to pay cash, but on being acquainted with your Easy Payment Plan we eagerly availed ourselves of the opportunity to pay in small monthly amounts, and used our ready cash for very necessary repairs to the house. I heartily endorse it."

NEWTON.
"I am surely more than pleased with the Edison service and would not be without it. I shall certainly recommend it every chance I get."

NEWTON.
"I was somewhat fearful that the annoyance and possible damage to the floors and wood finish would be so great that I should regret having ordered the change from gas to electricity. But, instead, we are more than delighted with your service, and it has been impossible to find a single place anywhere about the house where any injury to the property has been made."

SOMERVILLE.
"Electricity is one of the greatest things. It is without danger. It is very nice, you do not have to have any matches."

WINCHESTER.
"It is more convenient and cleaner than either gas or oil, and I might say safer than either of the above, as it does away with the necessity of striking matches all over the house. After using it for nine months, I could not get along without it."

WOBURN.
"I am very well satisfied with the wiring also with the light furnished. I have never had any trouble since the job was done and it is much cheaper than oil which I burned before I used electric illumination. I would not be without it."

DORCHESTER.
"We are more than satisfied with the change Electric Light has brought to our home. No other lights for us anymore. Vacuum Cleaner will be the next."

HYDE PARK.
"The cleanliness and convenience of the electric light far exceeds gas or kerosene. The ease with which it is operated and its reliability are such that we would not be without it."

FRAMINGHAM.
"Perfectly satisfactory in every respect."

HOLLISTON.
"Electric Light superior to all others. Am greatly pleased with the service, and am advising all my friends to take advantage of your installment plan."

HOLLISTON.
"We are very much satisfied with your service and often wonder how we ever got along with lamps."

SUDB..Y.
"Your plan for installation is very satisfactory and I intend to extend a little later and install electric range and heat."

WOBURN.
"It is very convenient in lighting quickly, in going about the house, especially by extra push buttons or switches at the doors. The light is beautiful and very brilliant. The electric radiator is very useful in heating any room where wall receptacle in, or by lamp connection and a fan would be fine in summer."

WATERTOWN.
"It is safe, satisfactory, saving of labor and a sane method of lighting; always ready when wanted. The easiest thing to forget is to turn off the cellar lights." (A light near the head of the cellar stairs prevents this.)

NEWTON.
"It is much cleaner and more convenient than any other; safer where there are children and more healthful."

We Have Hundreds and Hundreds of Testimonials Like the Above Which We Will Be Glad to Show You With the Names and Addresses if You Will Call

WE CAN DO THIS FOR YOU PHONE US TODAY

Last Call on March Sale Electric Grills, Special Price $3.75

THE EDISON ELECTRIC ILLUMINATING COMPANY OF BOSTON

General Phone Oxford 3300. 15 Stores

HOW THE BOSTON EDISON COMPANY UTILIZES THE TESTIMONIALS OF SATISFIED HOUSE-WIRING CUSTOMERS

written and designed by L. D. Gibbs, superintendent of advertising, present the following illustrated features: (1) The aristocratic character of a wired house; (2) electric lighting of reception and living rooms; (3) the dining-room and china pantry; (4) kitchen, cooking, pantry and refrigerating apparatus; (5) electricity in the laundry; (6) conveniences for health and comfort in the bedroom; (7) electrically equipped nursery and bathroom.

The Edison company's campaign for new business has been greatly facilitated by a canvass of the territory made early in 1915. The sales department set out to find the exact conditions in every building in the territory, to increase the uses of electricity of every customer, and to secure the greatest number of new customers possible. The Edison system, embracing 604 square miles, with 2669 miles of streets, was laid out in special districts, with a captain in charge of each. The captains were from the company's special sales force, and nine to twenty-one canvassers were assigned to each squad. Each man was instructed in rates, wiring contracts and prices, etc., and was assigned a particular route each day, marked on a map in colored crayons. Each day the previous day's work was turned in to the captain, who made out individual reports, tabulating the number of calls, completed reports and number of applications. From these a daily report was made up and sent to the Boston office. Boston proper was left until the work in the suburban district was completed, the task being harder in the city and calling for experience.

TABLE I—DATA ON BOSTON EDISON COMPANY'S HOUSE-WIRING CAMPAIGN

Year	New Buildings in Edison Territory	Considered too Cheap to Wire, per Cent	Owners Would Not Wire, per Cent	Buildings Wired, per Cent
1911	3,552	26.3	15.3	58.4
1912	2,880	28.2	10.4	61.4
1913	3,298	15.3	7.9	76.8
1914	2,806	11.1	5.2	83.7
1915	2,420	5.2	3.5	91.3

A plan for analyzing the information obtained was devised by having the canvassers fill in a card for each call, giving name, address, details of dwelling, present and prospective lighting and power requirements, appliance and general data, a key number being inserted against each question. Buff cards were used for residence reports, white for stores and blue for factories.

When the cards were turned in, the captain picked out those on which immediate action seemed necessary, and memoranda were sent to the particular departments affected. If on the first visit the house was closed, the canvasser returned until he got the required information; if closed for the summer, the cards were turned in to the captain, who noted them and filed them away until fall, when the house was re-canvassed. If the owner or tenant was not at home when the representative called, the latter left a business card stating that he would call again.

The completed information cards were transferred to Hollerith cards, giving a complete analysis of customers already on the lines, non-users, appliances in use, methods of lighting and power, and best directions for concentrating sales efforts. During the canvass large posters were distributed among the stores in the various districts and posted in suitable locations, featuring the slogan "Electricity for everybody."

Statistics on lighting service disclosed the fact that there were about 20,000 users of Edison light, 15,000

TABLE II—INFORMATION GLEANED FROM NEARLY 56,000 CARDS

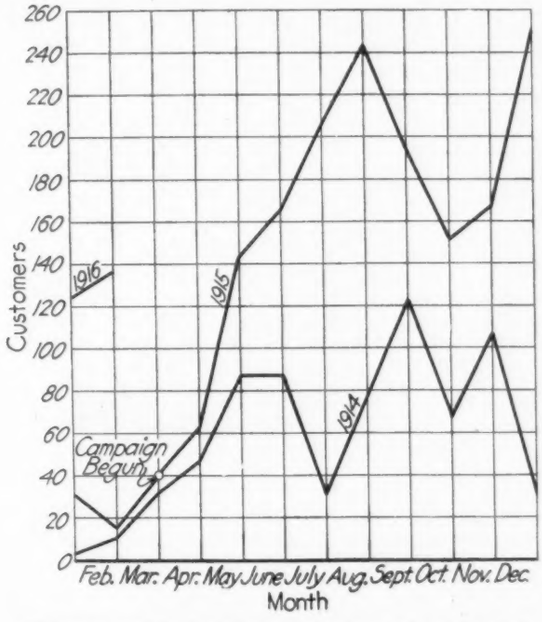
	Edison Service in Building		Service Not in Building	
	Customers	Prospects	Houses Wired	Not Wired
Service in building	19,313	2,357	.....	.....
Service not in building	.....	.....	2,157	30,591
Owners of building	10,761	311	712	10,839
Tenants	7,199	507	917	15,891
Prospects good	3,411	333	798	3,739
Prospects poor	7,015	166	331	7,480
Prospects bad	8,559	438	504	16,546
Dwellings	12,751	1,298	1,351	23,337
Stores	2,870	233	157	1,067
Apartments, two suites	1,683	225	203	4,495
Apartments, three suites	1,171	323	355	1,520
Wiring, none	.....	261	.....	29,935
Wiring, all	18,572	1,815	1,922	.....
Wiring, part	655	92	376	.....

gas users and 17,000 burning kerosene. Nearly 10,000 occupants of unwired houses showed an interest in electric lighting. Of customers having service in the building, 6724 were interested in appliances, and as a result the sale of appliances has been greatly increased.

A Two-Year Campaign at Worcester, Mass.—the Influence of Special Advertising

One of the most energetic house-wiring campaigns in New England was begun about two years ago by the Worcester (Mass.) Electric Light Company. The policy has constantly been to maintain good relations with the local contractors, to utilize the daily press in a vigorous way, avoiding hackneyed publicity, and, above all, to insure satisfactory installations and service. The installment method of payment has unquestionably been an important factor in the company's success.

An example of the influence of special advertising is afforded by the diagram reproduced herewith, which



EVIDENCE OF THE EFFECT OF NEWSPAPER PUBLICITY

illustrates the number of old houses wired between July 1, 1915, and March 4, 1916, on the Worcester system. Up to Dec. 11 239 contracts had been secured. From that date until early February the rate of increased installation was roughly uniform.

On Feb. 3 a special announcement was carried in the advertising columns of the Worcester dailies to the effect that the company's house-wiring prices would be advanced Feb. 15 on account of the increased cost of copper, brass and other electrical supplies. The usual allowance of one year in which to complete payment was emphasized.

Inquiries began to pour into the company's office within a few hours of the publication of the advertisement, and by Feb. 12 the company had secured probably fifteen more contracts than it would otherwise have obtained. The rate of increase was virtually doubled.

On Feb. 10 a second advertisement was run, pointing out that prices would be maintained until March 1 on contracts signed before Feb. 15, and on Feb. 20 the existing prices were extended until March 10. From the three advertisements the company secured about fifty-five house-wiring jobs, involving some seventy meter contracts. It also reached a large number of prospective customers who had been undecided about wiring, and naturally interest in electrical appliances was stimulated.

The company's schedule on house-wiring is $18.75 for nine outlets, each additional outlet costing $3.50. Flush switches cost $3.50 each, and three-way switches $7.50. A charge of $1 is made for each hardwood floor. The company figures wiring an eight-room house, including fixtures, for about $40. When a solicitor closes a contract he brings it into the office, and the following morning it is put on a bulletin board for contractors' use in bidding. The lowest bidder secures the contract, and at the end of the year the company refunds to each contractor practically the difference between his bid and the standard price, the bid, of course, being below the standard. The customer who pays cash is allowed a 5 per cent discount from the total installation cost.

Every installation is visited by an experienced lighting solicitor before the first month's bills are allowed to go out, to make sure that the customer is satisfied with the work performed.

How the Electrical Contractors Co-operated in a Three-Months Wiring Campaign at Concord, N. H.

The Concord (N. H.) Electric Company, one of the central-station properties under the management of Charles H. Tenney & Company, Boston, Mass., has obtained remarkable results from a three months' campaign for the wiring of existing houses in its territory.

The first step in the Concord campaign was to prepare a careful list of unwired houses on the company's lines. For this purpose the city record of property was consulted. A personal letter, signed by the local manager, L. J. Chase, was sent to the occupants of all the houses on the list. With the letter was inclosed a card, stamped and self-addressed, carrying blank spaces for the recipient to indicate whether interested or not. The form was worded, with a keen appreciation of psychological effect, as follows:

YOU MAY }
DO NOT } tell me about your offer.

The first, or permissive, response was easy to make, as involving no suggestion of obligation, while the negative "do not" carried so abrupt a meaning as to lead the person to avoid both it and the explanation it implied.

More than 50 per cent of the return cards were mailed back to the company, calls by telephone and in person bringing the number of responses up to over 75 per cent. Persons expressing interest were at once called upon by an agent of the company who had first got the confidence of the contractors of the city.

The contractors had already agreed to take the company's estimate of the cost of each installation as the price at which they would do the work. The agent, after sizing up the job, reported to the company the maximum price at which the job should be taken, with the possibility of shading it under favoring conditions. This price was communicated to the customer, with a plan for easy payment by which payments could be extended over twelve months and on large contracts to eighteen months, installments to be included with the monthly lighting bill.

On completion of the work the company paid the contractor 50 per cent of the bill, and on receipt of each payment from the house owner 50 per cent was paid over to the contractor, thus completing payments at the end of the twelve months, when the consumer completes paying for his installation. By this plan the company carries the account for one year, while the contracting firm carries half the account for a like time.

Enlisting the Bank to Finance House-Wiring

How a Cleveland Bank Is Co-operating With the Cleveland Electric Illuminating Company and the Electrical Contractors of the City to Supply Funds for Wiring Already-Built Houses on the Installment Plan

THE Cleveland (Ohio) Electric Illuminating Company has worked out and at present is operating a plan whereby one of the large local banks is financing the house-wiring work of the Cleveland electrical contractors. It has long been the practice of the Cleveland company to pay contractors commissions for soliciting house-wiring business, and it has been possible—and in fact necessary—up to the present time for the contractors to carry customers' house-wiring accounts, since the Illuminating company preferred not to become a collection agency for these accounts. The old plan under which the central-station company and the contractors were operating proved very successful, as is evidenced by the fact that about 4500 houses were wired in the city in 1915. The plan was open to the objection, however, that it tied up a great deal of the contractors' working capital.

Under the new arrangement the wiring will be solicited by the contractors on the ten-installment basis as it previously was, but collections will be made by the bank. In general the plan operates as follows: The electrical contractors of the city, acting for themselves and for the Illuminating company, solicit house-wiring business, estimating their costs according to the unit outlet, schedule agreed upon. For his work in soliciting the contractor is paid a commission by the Illuminating company. The wiring contract form, in addition to carrying on one side an agreement between the house owner and the electrical contractor, also carries on the reverse side a simple assignment clause in which the contractor transfers all moneys due under the contract to the local bank and in which the house owner agrees to make payments to the local bank.

Hence, when a contractor secures a job he takes the signed contract to the Illuminating company and deposits it there so that it will serve as a claim for commissions and so that it may be verified. When the job is completed, it is inspected by the Illuminating company. If it is found satisfactory, the contract is approved, sent to the auditing department and thence to the bank. Although the central-station company inspects the contractor's work in each case, it does not guarantee the payments to the bank.

Signed Contract Is Good for 50 Per Cent of Its Face Value When the Work Is Done

Later the contractor may call at the bank for payments due him on his completed work. At that time the bank will pay him 50 per cent of the face value of all contracts received from the Illuminating company bearing his name. He in turn gives the bank his 6 per cent interest-bearing note for the full face value of all of the contracts the bank is holding. As monthly payments are received at the bank from house owners they are divided, the bank crediting one-third of each payment to the contractor's checking or cash account and applying the remaining two-thirds to reduce the face of his note. This procedure for each contract is continuous until the contractor has received the full face value of the contract less the interest at 6 per cent on the cash advance and the 5 per cent charged by the bank for collecting the accounts. The collecting is to be done by the bank issuing coupon books through the contractors to the house owners. Each book will probably contain ten coupons, one to be presented at the bank with each payment. After the contractor has finished his wiring and has issued a coupon book to his customer, his dealings with the customer are completed. From that time on the customer deals directly with the bank.

Viewed from the standpoint of any participant in the transaction, this plan possesses advantages. It provides an opportunity for the bank to invest funds in a very secure propósition. Experience has shown that the percentage of uncollectible wiring accounts is low, amounting with most Cleveland contractors to a fraction of 1 per cent. The amount of this investment will, of course, grow steadily at first, but it will finally reach an almost definite amount and remain stationary. The plan also puts the bank in touch with a new group of property holders and gives it an opportunity to make them its patrons, and it assures the bank a good proportion of the business of the electrical interests in its city.

The plan relieves the central-station company of the duty of finding cash to finance the wiring of already-built houses and at the same time gives assurance that money will be available for expansion on the installment plan to an almost unlimited extent. It relieves the company further of acting as a collection agency for bills other than those for electric service.

But it is to the contractor that the greatest good accrues, for the plan provides him with working capital, it gives him an opportunity to expand his business, it permits him to make a saving by taking advantage of his jobber's cash discount offers, and it relieves him of all necessity of keeping cash books, because the bank can and will provide him with detailed statements of his operations at regular periods.

Caution Against Hasty Adoption of the Plan

M. E. Turner, sales manager for the Cleveland company, who originated the plan and whose efforts were largely responsible for placing it in operation, has declined at this time to make public all of its details for the reason that he considers his work an experiment. He has said, however, that to those most interested the plan seems destined to succeed. As it progresses it seems to present cumulative possibilities. Just now the greatest difficulty lies in keeping it within such reasonable bounds that every step taken may be tested so that the bad accounts the bank may acquire will be kept at a minimum. As soon as all parties interested in the plan feel that the experimental stage has passed and that all details have been finally settled full particulars will be given for publication. By that time it is also hoped that the temporary forms now in use will have been replaced by standardized forms and coupons suitable for use in any city.

Meanwhile Mr. Turner has expressed the desire that those interested in the plan and in its success study its fundamentals carefully and proceed with caution in adapting them for similar use in other cities. For, as he has pointed out, should any bank entering into this plan at the solicitation of its local central station acquire—through the bank's lack of detailed knowledge of the house-wiring business or through fraud on the part of some one connected with the plan—an unduly large percentage of uncollectible accounts, the news of the failure of the plan in that locality might defer for many years that general acceptance of it on the part of banks which news of local successes will surely stimulate.

How the Flag Campaign Has Spread and Grown

The development of the electric-lighted American flag, as a symbol of our individual patriotism, by its rapid growth and spread in popularity and influence, has outsped all records of our industry and all precedents in the popular expression of our nationalism. It was only in November last that the idea was conceived. Almost a month had passed before real progress in the project could be shown. But already more than 1400 *of these emblems of an eager patriotism have been purchased and installed in cities scattered over the entire country, and the men who are in closest contact with the movement confidently estimate that before the year is over fully* 10,000 *of these signs will be in circuit and at work supporting the great gospel of "America First." It is not a campaign in its usual sense. It is an appropriate popular expression of the rebirth of the national consciousness that has so vitalized the land through this last year.*

What part do you expect to play in it?

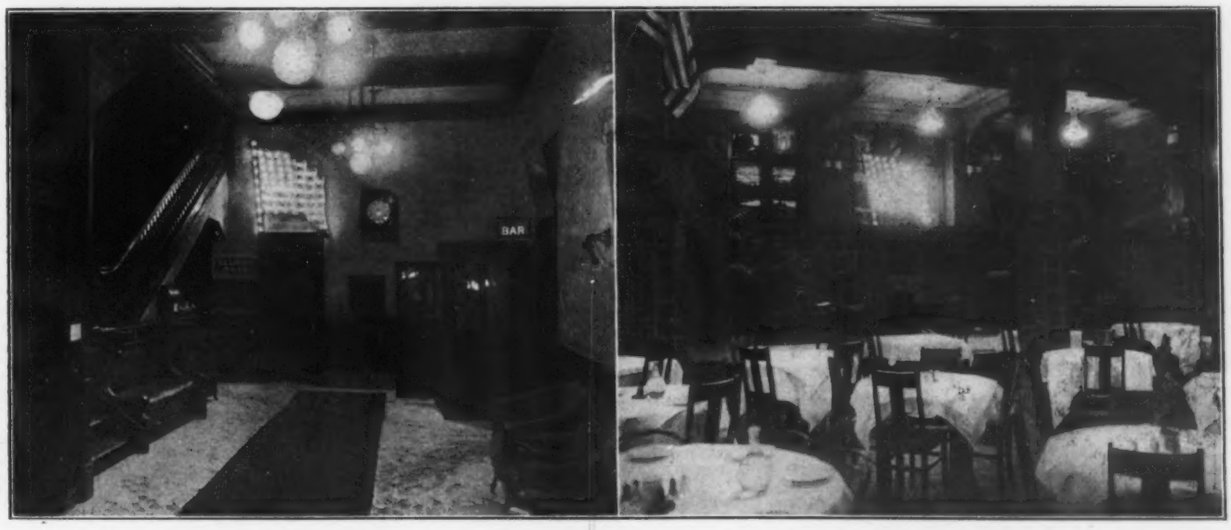
THERE are few electrical men who have not heard about the national electric-lighted American-flag campaign. They have heard how the man who first conceived the idea has been unwilling to permit his name to feature, how the guidance of the movement was intrusted to the National Quality Lamp Division, how the first attempt to introduce the idea to the public was made in Toledo, and how well all kinds of men responded. But it is hard to realize just how great a movement it has grown to be and what an opportunity it offers in every city. The purpose is unique, the situation is surprising, but the facts are not to be denied. The facts are these:

Within a few months' time the idea of presenting the national flag in the form of an electric-lighted emblem, an electric sign in other words, has been suggested to the American public by the manufacturers of incandescent lamps, co-operating with the sign makers and the central stations. They pointed out that in the present national crisis, which is recognized by all, no thought that can be seized upon to awaken the latent patriotism of the people should be overlooked, and that for such a purpose the flag has potency that nothing else possesses. They pointed out also that, though the patriots of nations for all time have lowered their flags at sundown, the reason has ever been that at night the flag could not be seen; yet, if it only could be seen, we know that the evening hours present the best time for the flag to speak its message. To electrify the flag, therefore, and make it a conspicuous feature of the night life in our cities seemed to offer an appealing opportunity, and the industry has appropriated it. It has introduced the flag sign to the public as a patriotic expression of the times, and the fact that central station, manufacturer, jobber and contractor will profit commercially therefrom should not and does not prejudice the idea.

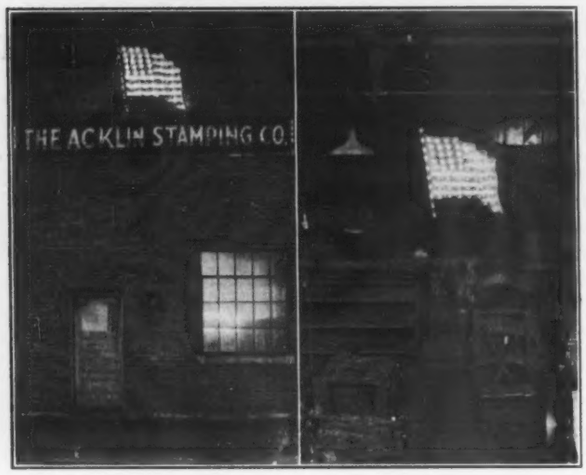
How the Idea Has Taken Hold

The experience of the Toledo (Ohio) Railways & Light Company in this campaign is particularly interesting as an evidence of how the actual selling of the signs is done. As has been reported in former issues, more than 350 flag signs have already been sold there and they are still going at the rate of four each day. It shows how this suggestion strikes the citizen—the manufacturer, the merchant and the business man. For the idea is that it should be a suggestion rather than a sale, with patriotism as the purpose, not commercialism. Toledo was selected as the place to try it out, because Toledo is already an enthusiastic electric-sign town and an enterprising business center; also in Toledo there was an efficient working organization of central-station sign salesmen ready to make the test.

Their campaign was most successful. They took the first dozen flag signs secured in Toledo and put two on the company's own building. They explained the purpose to the manager of the Secor Hotel and asked permission to install one in the lobby. They took others to leading factories, to department stores, to theaters and to a church, and arranged for temporary installations. But the idea appealed immediately to everybody, and each one of these signs was soon eagerly purchased as a permanent display. Manufacturers with many alien employees saw immediate value in the influence of such a symbol of our national spirit. Merchants whose names suggested foreign lineage seized on the opportunity to demonstrate their Americanism by erecting a flag sign



A HOTEL AND A CAFÉ IN TOLEDO WHERE THE FLAG GREETS EVERY GUEST AND THE PROPRIETORS CONSIDER IT A GOOD INVESTMENT



OUTDOOR AND INDOOR VIEWS IN TOLEDO FACTORIES WHERE THE ELECTRIC-LIGHTED FLAG IS SPEAKING TO EVERY EMPLOYEE

on their buildings. Twenty signs were sold to the Willis-Overland factory. An undertaker bought one. Stores, theaters, clubs and public buildings felt the appeal and bought. And A. K. Young, the local new-business manager, expects that fully 1000 flag signs will be in service in Toledo before the year is done.

And so the thought has spread across the country east and west, for the opportunity has been outlined in detail to over 4000 central stations in a series of letters, and the news of the Toledo experience is known to all. Already over 2000 companies have shown interest. Many have ordered signs. From Providence, R. I., to Oakland, Cal., the flags are being sold, and from Port Huron, Mich., to Galveston. Every week more lighting companies are taking up the work, and the sign manufacturers are actually put to it to keep up with the demand.

GOOD ADVICE FROM TOLEDO

Mr. Young of Toledo says:

"From personal observation I am aware that new-business managers the country over are becoming interested in the flag movement, for every day I receive letters from central stations which wish to know how we did it, and I find that most of the states have been represented in these inquiries. In writing them I try to give them the full benefit of our experience here, and my advice is this:

"First, post yourself completely on the proposition. You can do this easily by coming to Toledo and looking over the hundreds of flags we have burning every night. If that is not convenient, review the extensive literature already published on the subject.

"Second, take advantage of the national sentiment-appeal to patriotism. It is one of the greatest things in the world, and there is no limit to what folk will do to promote the glory of their flag. And, after all, why shouldn't our flag be on display after dark as well as in the daytime?

"Third, after having convinced yourself of the possibilities that the electric flag affords, realize that it is your own problem as sales manager to enthuse your sales force and to bring its members to your way of thinking. Don't be discouraged if the sales come slow at first. If they do, nine chances out of ten it is your own fault, just as it was mine that sales came slowly at the start here in Toledo. Careful study on your part and individual work with your salesmen will win the men over.

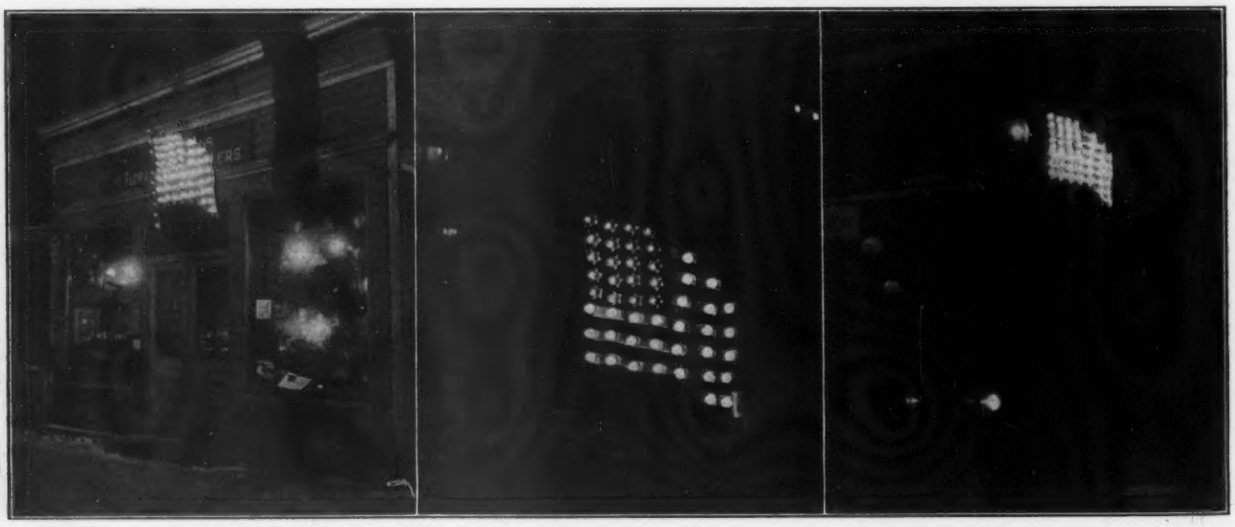
"Fourth, promote sales of only first-quality flags.

"Fifth, install them on your own property and, if necessary, present one or a number to your civic institutions, so that every one in your city will have the opportunity to witness the wonderful effect of 'Old Glory' electrified. It might be well to use your entire advertising appropriation for one month in buying flags to give away. The time for this will naturally be at the start, when a few flags judiciously placed where they can do you the most good will set up a strong current of public sentiment in your favor. The leading hotel lobby should display one of the first signs brought into your city. We saw to this in Toledo by putting one up in the Hotel Secor, and I know of one instance where a man from Stockton, Cal., ordered one from us after seeing that flag.

"Sixth, offer trial installations. We have been extremely liberal in this direction. Seventy-five per cent of the flags erected in Toledo to-day were first placed on that basis. Very few flags have been returned after once being installed—something less than 5 per cent.

"Seventh, take every precaution against all inappropriate promotion of this proposition. No advertising of any kind should be used in connection with the flag. Warn your salesmen of this, and caution them against employing any methods that might in any way detract from the dignity and honor of our national emblem. This is a vital point.

"I find that the selling of electric-lighted flags is a



THE FACT THAT A TOLEDO FLORIST, A LINCOLN (NEB.) CANDY STORE AND A SEDALIA NEWSPAPER HAVE BOUGHT SIGNS SHOWS HOW WIDESPREAD AND GENERAL IS THE APPEAL OF THE ELECTRIC FLAG

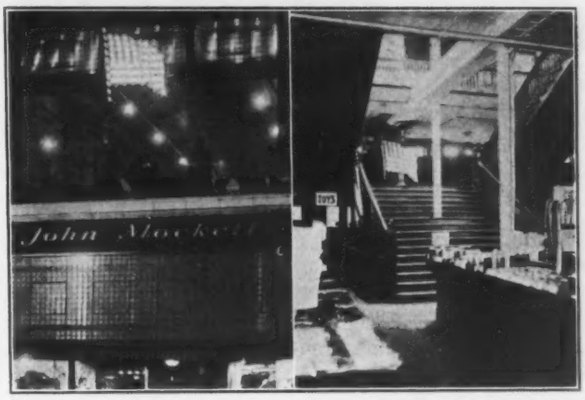
new-business manager's problem, and that unless he puts the proposition up to his salesmen in the right light his efforts in promoting flag sales are almost sure to end in failure. Do this, and the electric flag will earn you a generous revenue; but more important than revenue will be the good will that it will promote for your company and the influence it will yield to spread the spirit of 'America First.' "

The promise of 10,000 flag signs to be sold within the year seems well within the bound of possibility. For surely men are men and Americans are Americans in every city, and what Toledo has achieved in its campaign can certainly be repeated, at least in part, in any typical community in any state.

WHAT 10,000 SIGNS WILL MEAN

There is another point of view that is interesting to contemplate—the profit to our industry. For, though the fact that the movement possesses patriotic merit would unqualifiedly recommend it to all were not a dollar to be gained from participation in it, yet from the viewpoint of the central-station men, the electric-sign manufacturers, the makers of color caps, sign flashers and other auxiliaries, the producers of sockets and insulated wires, the electrical contractors, the lamp companies and the electrical supply jobbers, the flag campaign is of marked commercial significance. Consider the 10,000 flags estimated for the year's sales. To the central station—if it may be conservatively assumed that flags like electric signs will operate 2000 hours a year, that the energy consumed will return 5 cents a kilowatt-hour, and that the flags will average 1 kw. each in rating—this practically means that a new device has come into being which in its first year will return to the central stations revenue amounting to $1,000,000, and besides this gain in revenue most central stations will make some profit through the selling of the signs.

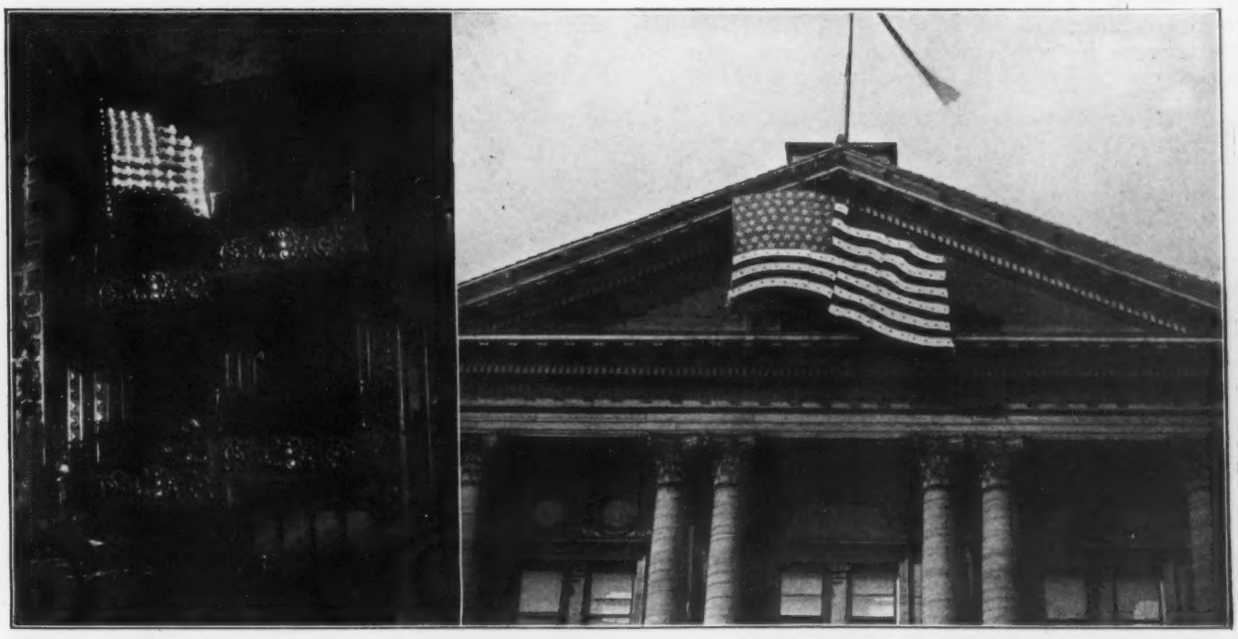
To the electric sign manufacturers, the electric-flag movement presents an unprecedented opportunity. It gives that industry something it has never had before—a piece of merchandise that can be sold like merchandise. Heretofore every sign has been to all intents a special job, designed and manufactured for the individual customer, but with the flag it is different. It is



FLAG SIGNS ON THE FRONT OF A WOMAN'S SHOP IN TOLEDO AND IN A ST. JOSEPH (MO.) DEPARTMENT STORE

standard merchandise that can be made in the valleys of the curve of factory production and can be stocked with jobbers and sold to central-station customers in lots of 10 to 100. It is a piece of merchandise that can be produced in such quantities that it can be sold at prices ranging far below the cost of ordinary signs of similar size.

Also, when opportunity knocks at the sign man's door the reverberations of the rapping may be heard distinctly in the quarters of the sign-accessory trade. The 10,000 flags that will be sold this year will most of them be equipped with flashers and with color caps, and on this basis some 900,000 color caps will be used. For it is safe to say that these 10,000 flags will average 100 lamps each, since the smallest flags—the 4-ft. size—carry ninety-one lamps. The estimate is that not less than 1,000,000 10-watt lamps will therefore be required, with as many sign receptacles, and with wire and solder, and tape and lock-nuts, and a volume of other necessary raw material that is bewildering. And in the selling of this material there is not a jobber, contractor or dealer who will not win his proper share of profit if he but participate and do his part in the extension of the campaign. The electric flag has proved itself a twofold opportunity that every good American within the industry should recognize and make his own.



IN THE GALVESTON THEATER (PICTURED AT THE LEFT) THE FLAG GLEAMS FROM THE HIGHEST BOX AS APPROPRIATELY AS ON THE CLASSIC FACADE OF THE LUCAS COUNTY COURT HOUSE IN TOLEDO

Electric Drive in the Shoe Manufacturing Industry

Economies of Transmission, Dependable Service, Flexibility and Uniform Speed Among Advantages of Motor Operation

By Norman G. Meade

PRACTICALLY all of the boots and shoes purchased in the United States are made in this country, while a large number are exported in addition. According to the latest statistics, the annual output of our 1900 shoe factories is about 248,000,000 pairs. To produce shoes from the raw material requires more than 100 processes. Boots and shoes are made in twenty-six different sizes, from No. 1 to No. 13, with the intermediate half sizes, and in five different widths. Modern shoe factories are divided into five principal departments. First, the sole leather is run through skivers which pare it, rejecting thin and ragged portions, and next the leather is solidified in a rolling machine. Soles are then cut out by means of power hammers or machine-driven knives following patterns. Heels are prepared with dies in various forms of machines, and uppers and linings are frequently machine-cut. Shoe tips are cut out by a punching machine with many shapes of dies.

The equipment of the stitching room consists of power-driven sewing machines, and in the bottoming department the uppers are lasted and soled, after which they are heeled. Different methods of heeling are employed, including the nailing together of the lifts by a nailing machine and building up and shaping on the shoe with several manipulations. The nailing machine cuts proper lengths of wire taken from a reel and drives them through the heel. In the last department finishing, polishing and turning are done by specially adjusted, rapidly revolving wheels. The final polishing is accomplished by burnishers and sandpaper machines.

In the manufacture of shoes there is now only a small margin of profit, and hence it has been the aim of such industries to reduce manufacturing costs to a minimum. In recent years electric-motor drive has been largely used for all machinery and has proved advantageous not only in the direct reduction of costs for power, but also in increased production.

Nearly 70 per cent of the operations performed in the making of shoes are now done on machines, since the improvements in shoemaking machinery have advanced rapidly. Small power requirements are the rule for this class of machinery, approximating 2.5 hp. for sole-cutting machines, down to as low as 0.1 hp. for small machines when operating under full load. The power is taken intermittently at times, hence group drive has been found best adapted to the work.

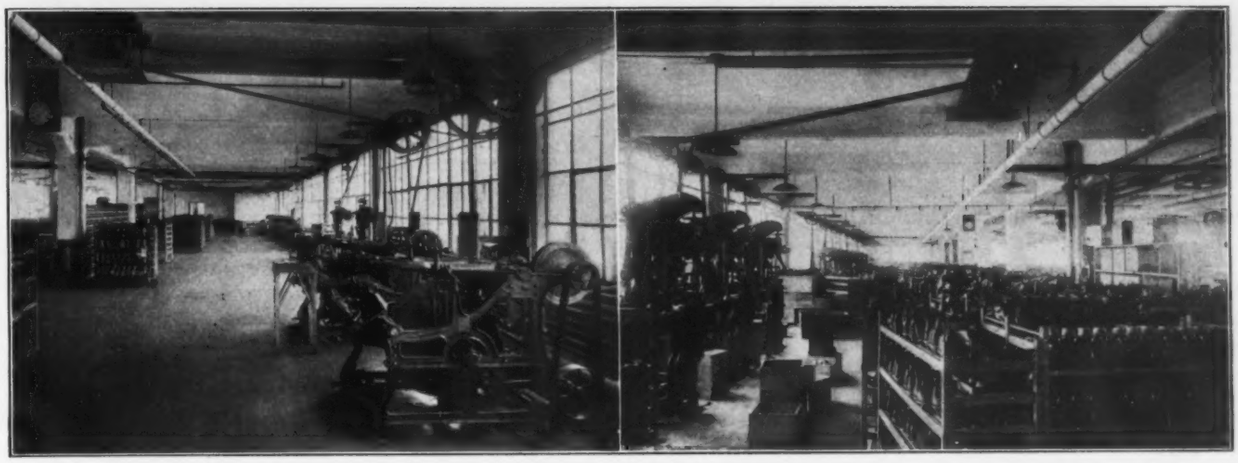
The advantages of electric drive in the manufacture of boots and shoes are many and varied. The principal advantages include economical power transmission, uninterrupted service, flexibility and uniform speed, aside from improved natural lighting facilities. By the use of electric drive it is possible to operate a plant consisting of several buildings at a power cost far below that of mechanically driven plants. Accurate power costs for the various departments are easily obtained, an advantage which facilitates keeping of correct expense accounts. With central-station service and electric motor drive a complete shutdown is practically impossible, and there is the further advantage of being able to operate any department overtime without the necessity of keeping shafts and belts for the mechanical transmission of power in operation throughout the plant.

It is essential that shoe machinery be operated at the highest speed possible to secure maximum output. This

SIZES OF MOTORS FOR OPERATING SHOE MACHINERY

Application	Hp.	Application	Hp.
Crimping machine	0.5	Goodyear channeler	0.06
Sole trimmer	1.5	McKay channeler	0.06
Edge setter	1.0	Buzzel heel shaver	1.5
Sandpaper wheel	0.3	Buzzel trimming machine	1.5
Grinder and buffer	0.5	Union twin edge setter	1.0
Buffing machine	0.1	Goodyear welt machine	0.4
Stitch separator	0.3	McKay stitcher	0.6
Buffer and blower	0.5	Staple-fastening machine	0.2
Special splitter	0.6	Sole-laying machine	1.5
Leather roller	0.2	Beating-out machine	0.2
Bus counter molder	0.6	Chicago wire fastener	0.3
Sole rounder	0.8	National heeling machine	0.5
Stanley leather splitter	0.6	Mayo heeling machine	3.0
Fifield tip skiver	0.3	McKay heel trimmer	2.0
Smith stiffening skiver	0.1	Consolidated hand laster	0.5
Dinker	0.1	Adams sole cutter	2.0
Scorer	0.1	Leather knife, 4-ft	2.0
Knox beam dinker	0.2	Die press, 4 ft	2.0
Knox end splitter	0.6	Lasting machines	0.2
Small skiver	0.3	Stitch-prick machines	3.0
Knox twin molder	0.8	Sewing machines (six)	1.0
Channel hip turner	0.1	Leveler	2.0
Fisher channel turner	0.1		

MOTOR DRIVE IN THE SHOE FACTORY OF ENDICOTT JOHNSON & COMPANY, LESTERSHIRE, N. Y.—SOLE LEATHER CUTTING MACHINES AND GROUP OF CLICKING MACHINES



AT LEFT—SOLE LEVELING MACHINES, CHANNEL CEMENTING AND LOOSE-NAILING MACHINES. AT RIGHT—LEVELING, BUFFING HEELING AND SLUGGING MACHINES—FACTORY OF THOMSON-CROCKER COMPANY, ROXBURY, MASS.

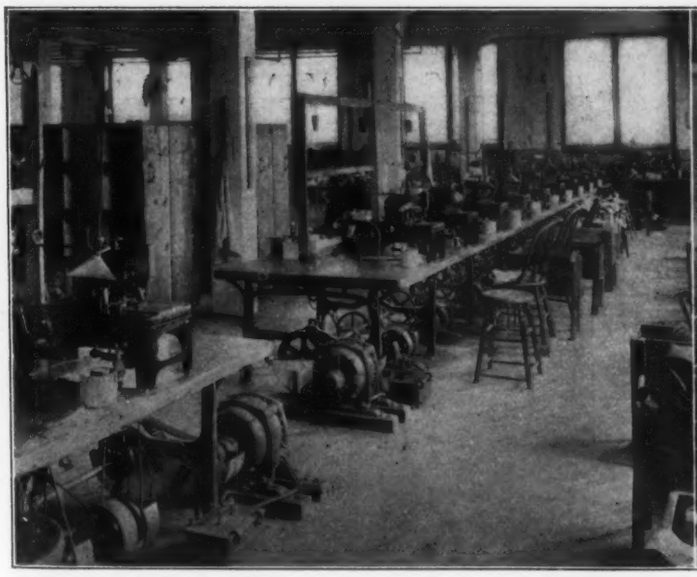
is easily accomplished by arranging the machines in small groups, thereby eliminating the speed fluctuations always accompanying the use of long line shafts. Uniform speed is of vital importance for edge trimmers and similar machines, since varying conditions of speed result in imperfect work. With electric drive the cost for power is very nearly proportional to the work done and increase of floor space is made possible by eliminating mechanical power-transmitting devices.

Exhaust fans are used to a large extent in shoe factories for the removal of dust, chips and shavings of leather, which are collected from the various machines. From 30 to 40 per cent of all the power required in such establishments is used to operate these fans. The usual practice is to operate the exhausters in pairs, preferably by a motor with extended shaft at each end. Ordinarily, for driving sewing machines, motors of 5 hp. and below are employed, as well as for such machines as button-stitching machines, buttonhole-stitching machines, small skivers and bobbin winders. The motor is usually connected to the countershaft under the benches by means of silent chain or belt, and from ten to thirty machines are driven from each motor. Motors designed to operate at about 1200 r.p.m. are generally used, since the line shaft speed is about 350 r.p.m., which allows a speed reduction of about three to one.

From the following description of some typical shoe factories an idea can be gained of the electrical equipment of modern establishments of this kind. One of the largest shoe factories in the world is that operated by Endicott, Johnson & Company in the city of Lestershire, N. Y.

The factory building is five stories in height, 640 ft. long and 50 ft. wide, and its normal output is about 1200 cases of shoes a day. The arrangement is really two duplicate factories in one building, and electric motor drive is used throughout. The motor equipment includes upward of 150 220-volt General Electric motors. The sizes range from 35 hp. on the blowers down to 0.5 hp. on box machines and stitchers. For motors having a rating higher than 5 hp. starting compensators are provided, while those smaller than this size are controlled through simple push-button control switches connected directly to the source of power. The group of factories belonging to this company have a capacity of 40,000 pairs of shoes daily.

For operation of the fifty polyphase motors in the Thomson-Croker company's factory at Roxbury, Mass., which is another important installation, central-station service is furnished by the Edison Electric Illuminating Company of Boston. The aggregate horsepower is about 150, and the motors range from 0.5 hp. to 20 hp.



GROUPS OF STITCHING MACHINES DRIVEN BY 3-HP. MOTORS

EXHAUST BLOWER OPERATED BY 20-HP. MOTOR

Lighting a Small Art Gallery with Gas-filled Lamps

Experimental Work Leading to Use of 100-Watt Units in Reflectors Above Skylight of J. J. Hill's Private Gallery at St. Paul, Minn.

BY ARTHUR L. ABBOTT

THE artificial-lighting system formerly in use in the private art gallery of James J. Hill, which houses a collection of valuable paintings, was very crude and unsatisfactory. It consisted of a wood platform or canopy measuring about 10 ft. by 15 ft., suspended by steel rods from the ceiling at a height of about 9 ft. above the floor. This canopy was used to support four polished-metal trough reflectors containing 107 40-watt tungsten lamps, the troughs being so placed as to direct the light toward the four walls of the room. The construction was very unsightly and shut off nearly all daylight from the center of the room. Moreover, the artificial light on the walls was very unequally distributed and came from a bad angle so that the glare due to direct reflection from the surface of the paintings was very annoying.

From a study of local conditions, it seemed probable that a satisfactory lighting system could be designed with the lighting units placed above the skylight. This skylight is of clear glass which has small irregular corrugations or ripples on one side but is not sand-blasted or otherwise frosted. Moreover, it was evident that the only way to secure a reasonable degree of economy was to direct as large a part of the light as possible toward the walls of the room. With this in mind, a study of the section of the room showed that the lighting units should be placed near its center line for lighting the side walls and at a corresponding distance for lighting the end walls, and that a very concentrating reflector should be used in order to confine a considerable portion of the light flux within a useful zone. Just what effect the skylight glass would have upon the distribution of this light was unknown, so that a trial installation was made from which the net results could be noted.

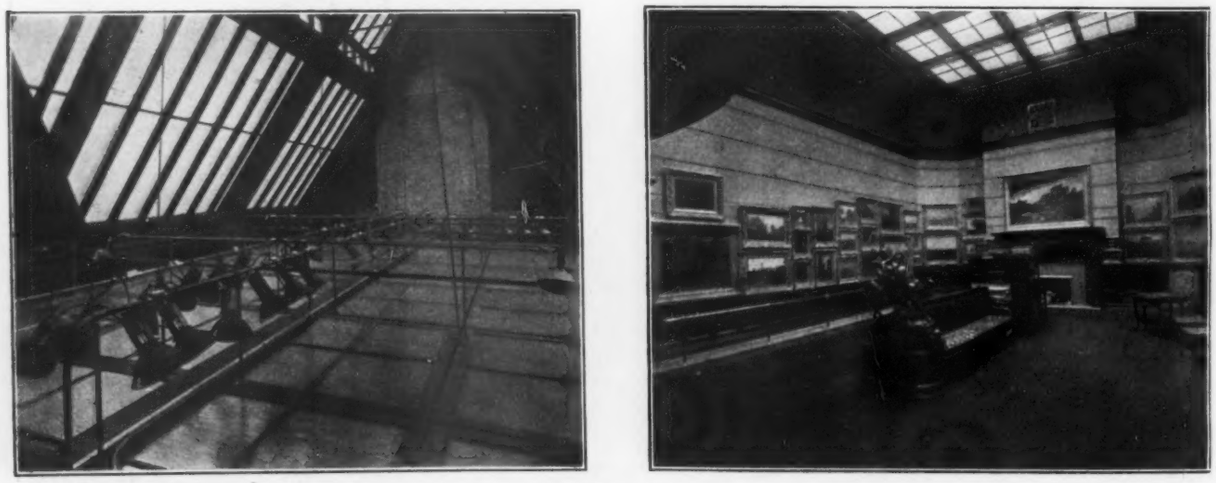
Stereopticon-type reflectors were obtained, and tests were made with 100-watt and 200-watt gas-filled tungsten lamps of the ordinary type. The results, reduced to the form of polar curves of candle-power were carefully compared. These measurements were taken in a plane 10 ft. below the center of the lamp filament. The distribution given by the 100-watt lamp with the center contact 3½ in. above the upper edge of the reflector was almost exactly what was wanted, and this unit was therefore selected for trial.

On this trial installation eight units were used, spaced 3.5 ft. apart, center to center, placed 1 ft. from the center line of the gallery, and inclined at a predetermined angle to direct the light onto the walls of the room. The results were satisfactory except that a higher intensity of light was considered desirable. A permanent installation was therefore designed and installed, decreasing the spacing to approximately 2.5 linear ft. of wall space per unit. The skylight sash offered some obstacle to the proper spacing of the units, since it was necessary to place them between the sashes so that a large part of the light would not be cut off by the wooden frames.

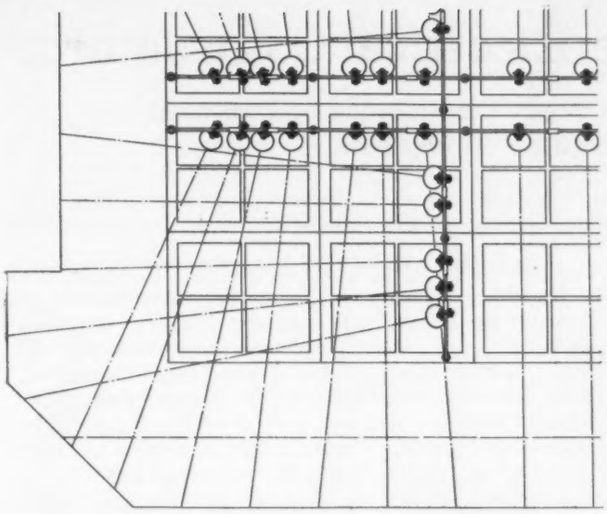
At one end of the room a pipe organ, two doorways and a narrow balcony leave no space available for hanging pictures. The units were therefore arranged to light three walls of the room only, except that two 200-watt units were installed to bring up the general illumination of the fourth wall and avoid too great a contrast with the rest of the room.

The lamps and reflectors are supported by a horizontal frame of ¾-in. conduit, the center of which is 2 ft. 3 in. above the glass. Special holders were designed to hold the reflectors rigidly in the proper position with respect to the sockets. These holders were supported by simple two-piece strap-iron supports, attached to the ¾-in. conduit with hook bolts and arranged so that the entire unit could be swung through any angle in two planes, thus providing complete adjustability.

After the installation was completed, tests were made to determine the illumination intensity on the walls, but owing to some difficulties encountered the results were not satisfactory. The measurements taken, however, indicate an intensity of about 6.5 ft.-candles, quite uniformly distributed over the wall space occupied by the pictures, except for a slight falling off toward the floor. The angle at which the light is received on the pictures from the lighting unit is such that there is absolutely no direct reflection from the surface of the canvas to the eye of the observer, and the lighting system as a whole is considered very satisfactory. No attempt was made



THE BATTERY OF REFLECTORS AND 100-WATT GAS-FILLED TUNGSTEN LAMPS ABOVE THE SKYLIGHT OF THE HILL ART GALLERY



A CORNER OF THE SKYLIGHT CHAMBER, SHOWING HOW THE REFLECTORS WERE DIRECTED TO LIGHT EACH UNIT OF WALL SPACE

to secure a uniform brightness of the glass in the skylight, as it was considered that such uniformity was neither necessary nor practicable in a room of such dimensions.

Excluding the two units used for lighting the wall on the entrance side of the gallery, there are forty-four 100-watt gas-filled tungsten lamps installed. These light a wall space of 104 linear ft., making the expenditure of energy 42 watts per linear foot.

To Lift the Burden of Slow Pay

A Suggestion to the Jobber and the Contractor in the Matter of Their Joint Collection Troubles

BY EARL E. WHITEHORNE

The jobber of electrical supplies is never-ceasingly harassed because he cannot make collections promptly from the contractor. The contractor in turn is suffering perpetually because it is impossible, and always has been, to collect his money from the customers whose houses he has wired. The householder is slow in paying him. That interferes with his own obligations to the jobber. And the jobber who must buy on stated terms of payment, if he is to get full benefit of profit margin in his purchases from manufacturers, is compelled to stand between these two conflicting situations and carry the burden of slow pay.

The contractor appreciates the difficulties that the jobber labors under and sympathizes, but he has been able to devise no way to get his money when it is due. Again, the jobber knows that it is not the contractor who really is to blame; he cannot pay if he cannot lay hold upon his money. And so the matter has been talked about year after year. It seems to me that as an industry we can begin to plan and act a bit toward finding the relief that can come only from the one direction. Many lessons in co-operation have already been assimilated, and as far as theory goes this one should not be very hard to teach.

WHERE THE FAULT LIES

Of course, the basic factor in the whole thing is the man who owns the house, the man who tells the contractor to do the job, and then neglects to pay the bill in thirty days. He is the independent trouble maker that is quite beyond our reach and power, and yet we know him well. And I believe there is a way to get the money that he owes on time and satisfy him better with the bargain. He is two kinds of man—just two kinds—and the error we have made is in attempting to do business just as though all men were quite alike and our one selling proposition would be suitable for all.

There are two kinds of men who give their orders to the contractor to wire houses—men with money in the bank who can afford to have their houses wired, and men who want their houses wired but are not able to pay cash for it. It is folly for the contractor to tender equal terms to both, when one inevitably will have to disappoint him and involve him in financial straits. The man who simply cannot find the money cannot pay the bill in full in thirty days—why ask him to? The man who has the money can—why let him hold you up? And there you are.

WHAT THE JOBBER CAN DO

There is a logical solution, I believe, that will be worked out through a businesslike co-operation in the electrical fraternity in every city. It will come through an agreement of the contractors among themselves and an arrangement made between them and the central station. It will take care of the customer who has the ready money and the "prospect" who has not. But the initiative will probably devolve upon the jobber—he will be called upon to sow and cultivate the seed. In other words, the costly burden of slow pay rests now most heavily on him, and he it is that best can turn the purpose to a habit—a habit that will give the man who cannot pay in cash an easy-payment contract and will make the terms of payment a condition of the cash contract that governs work done for the man with money in the bank. The public will be obliged to buy house-wiring as it buys house-building—for a price with payments stipulated—and contractors will agree among themselves on terms of payment, and these in turn will be discussed with every customer no less than terms of work, and satisfactorily agreed upon before the contract can be signed. And the man who cannot promise to pay cash in thirty days must buy at slightly higher cost on easy payments financed probably by the central station on the basis that is being introduced already with success throughout the country.

A PLAN WORTH TRYING

It is a pretty theory. I admit it. Yet all things are simply theories till they are applied—and greater wonders of co-operation we are seeing all about us year by year. And I believe the jobbers of the industry can find this answer that they seek and solve the problem of their vexing credit and collection situation if they will begin now and enlist their salesmen as good missionaries in this cause. It has not paid to try to treat this matter of the money as just a jest between the seller and the man who buys. It has not paid in this or any other business, and it never will.

Of course, it will take time, a movement of this kind. It will take patience. For there will be many towns where half the contractors will not agree or where they will seemingly agree but will dodge the issue when it seems to jeopardize the winning of a job. But no big opportunity comes handily equipped with a self-starter. It must be cranked and cranked again, and to a great extent this one appears to be the jobber's motor car. The weight of this great burden of slow pay has settled down on him, and he will lift it only by some action of this kind. The jobber can begin to-day to preach this principle to every customer, in his letters, by his salesmen, by example, and, I believe, the impulse of an influence of this kind will slowly, surely bring results. There is no other way.

Testing the Fitness of the Electrical Contractor

The Plan by Which New York City Has Begun the Licensing of Persons in Responsible Charge of Electrical Wiring Work

UNDER the new building code of the city of New York every electrical contractor and maintenance electrician who does electrical wiring work must first pass examination or approval by the city's license board. These examinations are held each Friday in the new Municipal Building, and in order to qualify for licenses the applicants must obtain a grade of 70 on their written answers to the twenty practical questions asked. Since the licensing ordinance went into force last October, the board has received 2850 applications for examination and has granted 1650 licenses.

Unlike the provisions of certain other state and city electrical license laws, the New York City ordinance grants no exemptions from examination by the board on the point of mere established experience in electrical work. Firms engaged in electrical contracting work are allowed to have their foremen or other responsible employees take the examination in their behalf. Such firms must show, of course, that the persons taking the examinations are regularly in charge of their construction work.

LICENSES FOR CONTRACTORS AND BUILDING ELECTRICIANS

Any electrical contractor who maintains an established place of business in the city, and presents with his application a list of at least twelve complete electrical installations made by him, is entitled to apply for examination to become a licensed electrical contractor.

Three classes of licenses are issued: (1) Licenses for electrical contractors who engage generally in the business of installing, altering or repairing electrical work; (2) "special licenses" for building electricians and those who do work in certain specified buildings, and (3) "special permits" constituting authorization to install a single job of wiring. A contractor's license to do general work costs $10 the first year and $5 a year for renewal. The special licenses and special permits cost $1 each. Holders of licenses or special licenses are required to file application for certificates of inspection before beginning work. Persons desiring a special permit must obtain this before commencing work, and must also apply for a certificate of inspection at the same time. It will be noted that journeymen electricians and wiremen are not required to have licenses as long as they work under the supervision of a responsible licensed contractor or building electrician.

REPRESENTATIVE MAKE-UP OF THE LICENSE BOARD

The license board which passes on the fitness of applicants consists of seven members specified by the ordinance as follows:

1. An officer or employee of the city electrical department.
2. A master or employing electrician.
3. A journeyman electrician.
4. An underwriter's electrical inspector.
5. An electrician in the employ of a public service company.
6. An architect or builder with at least five years of practical experience.
7. A real-estate owner or broker.

The representative of the city department acts as chairman of the board, but the other members serve without compensation.

The board as appointed by Commissioner Williams when the new ordinance took effect, and as since constituted, has the following members:

Hubert S. Wynkoop, electrical engineer Bureau of Gas and Electricity, Municipal Building, chairman; John P. Ryan, electrical contractor; Paul McNally, journeyman electrician; Joseph C. Forsyth, electrical inspector; Arthur A. Pope, electrician in employ of New York Edison Company; Fred G. Webber, practical builder, and Elmer D. Coulter, real-estate owner.

THE SCOPE OF THE EXAMINATIONS

The written examination given applicants consists of a list of twenty questions specially prepared for each examination, and covering practical subjects of wiring, fixtures, maintenance, motor connections, signs, etc. Usually there is also a question on garage wiring, one on theater construction, and one on wiring for radio or "wireless" apparatus. Since a grade of only 70 per cent is required in order to pass, the man who has a practical knowledge of wiring need not fear for his success in making a satisfactory grade, even if he lacks familiarity with some of the special branches touched upon in some of the questions. Thirty-five to forty applicants are now taking the examinations each week. An applicant who has taken an examination and failed to pass, may take another examination one month later, but on failing in this also, he is excluded from re-examination for six months.

On special action of the board in each case, oral examinations are granted to applicants who cannot read or write, or who claim that they have not been able to understand the questions or to express themselves in writing commensurately with their practical knowledge of the work. Men who have failed to pass the written examination through difficulty in putting their ideas on paper, have in several cases been able to convince the license board of their practical ability and familiarity with the code. On the other hand, applicants who failed on the written test and asked for an oral hearing, have made even lower grades under the searching inquiries of the practical men who make up the license board.

SOME RESULTS OF THE LICENSING PLAN

A penalty of $50 is prescribed by the ordinance for each violation in doing electrical work without a license or for failing to comply with the requirements of the ordinance and code. The commissioner of gas and electricity has, under the ordinance, the power to order the connection of electrical defects and to disconnect and seal the supply wires and apparatus if his orders are not complied with. So far some 200 cases have been sent to the corporation counsel's office, and in most of these cases the conditions to which objection was made have been promptly corrected upon notice from the corporation counsel that prosecution would be begun in five days. Hardly one case in twenty has been allowed to go as far as the courts.

Results of the practical usefulness of the new ordinance are already evident in the reduced number of "violation notices" which are being sent out, for the number of these notices has been actually decreased by one-half since the enaction of the ordinance. Corrections of violations are, in general, made promptly. For the first time, a comprehensive list of the firms and individuals who do electrical work in the city is now available, and responsibility for improper work can be quickly and definitely placed.

The $50 penalty clause has impressed alacrity on all persons who do wiring work, in making themselves known to the proper city authorities, and all such work which now goes in can be safely counted to be the work of persons thoroughly familiar with the code requirements.

MARKETING ELECTRICITY

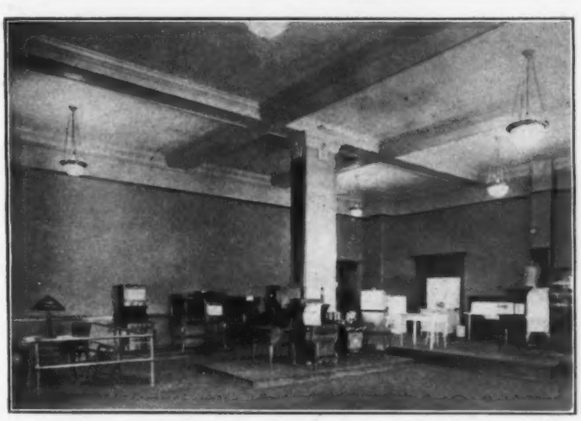
A Department on Selling Service and Widening the Use of Electrical Energy

"It's An Ill Wind" That Sells No Vacuum Cleaners

During last month several very severe sand storms occurred at Colorado Springs, Col. Fine dust was blown into rooms and buildings, coating carpets and floor coverings. No sooner had the first of these sand storms abated than the Colorado Springs Light, Heat & Power Company took advantage of the situation to feature its vacuum cleaners for ridding the carpets and rugs of the effects of the storm, and so successfully was the proposition advertised that twenty vacuum cleaners were sold as a result.

Daily Cooking Demonstrations in Milwaukee Exclusive Electric-Range Store

The Milwaukee Electric Railway & Light Company has opened an electric-range display kitchen and demonstration room and has begun in earnest a campaign to place electric ranges in Milwaukee homes. The showroom used for this range exhibit is provided with a completely equipped kitchen for the use of the two domestic-science demonstrators who are employed continuously in the store. One of the demonstrators lectures at 3 o'clock each afternoon and cooks various foods and distributes them among the visitors. The application of the electric range to various cooking methods is demonstrated and the advantages over other means of cooking are pointed out. General Electric, Hughes, Westinghouse, Simplex and other ranges, each in several styles, are on display in the room, and two of them are connected up for use in doing the cooking and baking. When the store was opened the company sent out invitations to its customers announcing the daily lectures. At the same time newspaper advertisements



EXCLUSIVE ELECTRIC RANGE SALESROOM AT MILWAUKEE

announced the opening, and a large amount of space has since been regularly used to advertise electric cooking.

The cleanliness and convenience of the electric range have made it particularly popular with apartment-house owners and tenants. All ranges are sold at a price which covers the necessary wiring installation and insures the range being set up ready for operation.

Making the Electrical Contractor's Store Attractive

In planning the arrangement of their new salesroom at Salem, Ore., F. S. Barton and R. D. Barton, who operate an electrical contracting and supply-sales business, took care to make the impression of the surroundings on the business visitor as agreeable as possible. It

THE MIRRORED DOORS AT THE REAR OF THE SALESROOM OPEN INTO CABINETS WHERE THE MORE UNSIGHTLY STOCK IS KEPT

is the policy of the company to conduct a purely electrical store and not to cut into other fields of merchandising than those that are purely electrical. For example, no gas fixtures are sold by this Salem firm and automobile accessories are handled only so far as they are electrical. The slogan of the store's advertising is "If it's electric, come to us."

All appliances are exhibited in well-built showcases. Good pictures line the walls, and a number of handsome lamps and domes displayed throughout the salesroom make the interior inviting. The mirrored doors shown at the rear in the illustration open into cabinets where the more unsightly stock is kept. Behind the wooden partition is the fixture room, while in the basement are the stock room, the repair shop and the storage-battery department.

The Economy and Safety of Electric Brooders

At the recent meeting of the New England Section, N. E. L. A., it was stated that electricity at 3 cents per kilowatt-hour is cheaper for use in heating chicken brooders than kerosene oil. A 120-egg incubator will consume from 36 to 42 cents' worth of energy in hatching its contents. W. H. Blood, Jr., insurance expert of the National Electric Light Association, said in this connection that kerosene invalidates the insurance on a farmer's residence if a lamp-operated brooder is left in service in the cellar, and that many disastrous fires have resulted from this cause. The electric brooder, therefore, offers the central station an excellent, even if a small, night load.

A Washing-Machine Sales Contest on the Pacific Coast

A novel prize contest for washing-machine sales has been inaugurated among the properties of the Pacific Power & Light Company in small towns in Oregon and Washington by J. E. Davidson, vice-president and general manager. The plan contemplates the award of cash prizes to local branches and employees who make the best selling records between now and May 30.

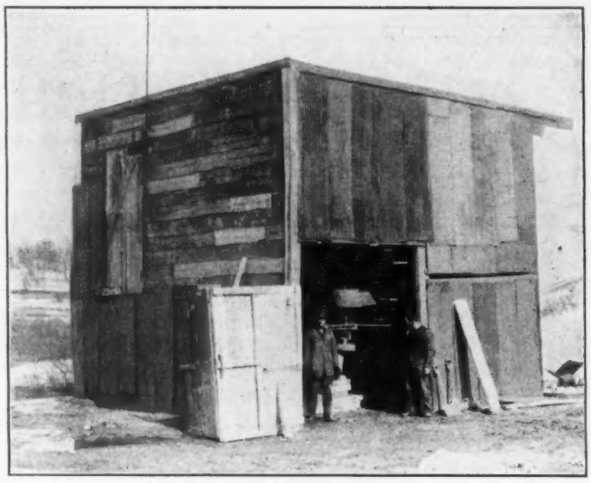
A cash prize of $50 is offered to that branch office which sells the largest number of machines as compared with its total number of customers. This condition automatically puts the large and small offices on a basis of equality. No office will be eligible for the prize unless it sells machines to the number of 1 per cent of its customers. Thus a branch with 800 customers will have to sell eight machines before it can qualify in the competition, although, of course, machines sold to qualify count in the final record.

Half of the prize will be paid to the local manager. The other half will be used by employees in any manner they wish, or will be divided among the employees doing the best sales work according to the judgment of the local manager. No money will be paid to new-business solicitors.

In addition, a cash prize of $15 will be paid to the new-business solicitor who makes the best sales record on the entire system. To win this prize at least ten machines must be sold. A similar cash prize will be paid to the employee other than a solicitor who sells the most machines, provided that he disposes of at least five.

Rubber Stamps as an Aid in Billing

The Southern Illinois Light & Power Company of Hillsboro, Ill., has found that a set of rubber stamps is a great aid in making out electric-service bills for residence customers. The company's system of charging is based on a simple sliding scale of rates so that it is only necessary to provide rubber stamps for the amounts of electricity which are most commonly met with in making out the bills. There is, for example, a stamp for customers using 16 kw.-hr. It carries, besides the figures "16 kw.-hr.," the price per kilowatt-hour, the result of the multiplication, the amount of the prompt-payment discount, and the result of the subtraction or the net bill. W. F. Corl, superintendent for the company, in mentioning the use of the stamps before the convention of the Illinois State Electric Association, declared that the stamps saved both time and money.



MARBLE MACHINE DRIVEN BY 15-HP. MOTOR

Long-Hour Motor Drive in the Manufacture of Monuments

Among the long-hour loads served by the New York & Queens Electric Light & Power Company, Long Island City, N. Y., is the 15-hp. motor installation of Joseph Scharf & Brother, which converts into tombstones building stones that have been taken from dismantled buildings. When such structures are to be torn down there are a number of dealers who make it a practice to buy up the good stones left in the foundations. This material is purchased by the Scharf brothers, who polish the marble and make it into monuments.

Flood-Lighting of the New Hill Building, St. Paul, Minn.

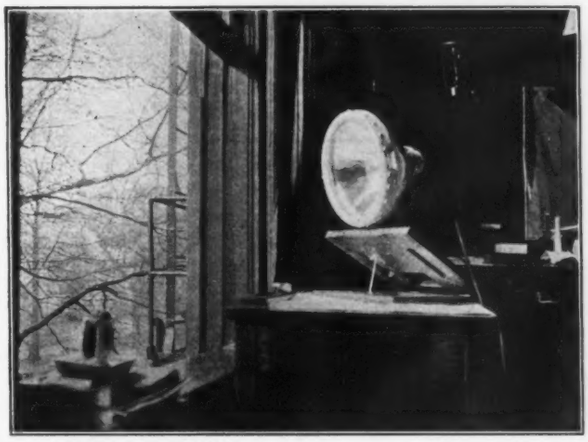
For the night illumination of the new thirteen-story Hill Building in St. Paul, Minn., a battery of sixty lamps and reflectors has been mounted on a framework on the roof of the two-story building diagonally across

FLOOD LIGHTING THE NEW HILL BUILDING, ST. PAUL, MINN.—THE BANK OF SIXTY PROJECTOR LAMPS AND THE HUGE OFFICE STRUCTURE AS IT APPEARS ILLUMINATED AFTER NIGHTFALL

the street intersection. Despite the comparatively great distance of projection, the installation has proved very successful, although comment has been made that the lighting units themselves present an unattractive daylight appearance. The building houses the offices of the several J. J. Hill properties, and is supplied with energy, for lamps and motors as well as for the flood-lighting, by the Consumers' Power Company of St. Paul.

How a Flood-Lighting Salesman Demonstrates His Wares

A salesman who visits central stations and electrical contractors in the Middle Western States to sell flood-lighting equipment and other reflectors has developed a novel selling idea. Upon arriving in a town he selects his hotel room with care so that some lightable surface, such as a billboard, an unlighted sign or an attractive building, will be opposite the window of his room. Once in his room, he unlimbers his equipment, connects it to



FLOOD LAMP MOUNTED ON A TABLE IN A HOTEL ROOM READY TO LIGHT A BILLBOARD ACROSS THE WAY

a lamp socket, aims it at the dark billboard across the way, turns on the switch if dusk is approaching, and goes out to hunt a sign painter. From the painter he secures a long, narrow sign bearing the legend "Lighted with one projector" or some similar phrase. This sign he hangs on the billboard or other surface in such a position that it will not interfere with the other signs or be in the way. Then he is ready for a customer.

Long before he is ready, however, he generally has several "prospects" and a group of interested onlookers, for the sight of a baby searchlight playing its beam on a formerly dull and uninteresting billboard is something to incite curiosity and interest. So, when he gets his central-station friend, together with one or two of the town's prominent business men, to come to the hotel to see the demonstration, he has no trouble in proving that a flood-lighted sign will be read by every passerby or that a flood-lighted building will attract attention.

This salesman's method of mounting his demonstrator lamp is also unusual. The base of the lamp is attached with wood screws to a pair of boards which are hinged so that they can be swung apart like the leaves of a book. They can be held apart, to give the lamp elevation above its support, by a door hook such as is ordinarily used on screen doors. Portions of the boards, which are provided with end braces to prevent splitting or warping, have been cut away to decrease the weight of the outfit and to provide convenient handholds for carrying the equipment.

Some Show-Window Axioms Applied to Electrical-Appliance Displays

The elementary principles of advertising which apply to show-window decorating may be summed up in three words, "Attract, interest, hold," declared H. Thurston Owens in a talk on window displays before the employees of the Westchester Lighting Company, Mount Vernon, N. Y. "The design and arrangement will attract attention," continued Mr. Owens, "charm or timeliness will hold the interest, and a useful application well demonstrated will create desire.

"When you have something to sell by means of a window display, you have four problems: First, convince yourself what it will accomplish and how. Second, arrange it in your window so that its usefulness is demonstrated. Third, complete the scene by making the setting harmonious and pleasing with suitable furnishings, etc. Fourth, add something that will attract attention, such as color arrangement or motion. You see we have worked our problem backward and in this way made sure of the final result, desire. This is the one of real importance."

CHOOSING THE SUBJECT OF THE DISPLAY

"A good story is worth telling twice," continued the speaker. "What story can we repeat with the best result? (1) The one that tells about the article your company is pushing at the time; (2) about a seasonable article; (3) about one that has some news value; (4) about an article that is offered at a reduced price; (5) about something that is to be increased in price.

"The lighting of the show window should be a model, both as to arrangement and as to the hours of burning. It should represent your ideas as to what others in your community should have.

"Be careful not to waste light, for if you do your neighbors will immediately say that you can afford to 'light up,' because it costs you nothing, but it would be too expensive for them.

DON'TS FOR THE WINDOW DESIGNER

"Don't try to sell fifty-seven varieties at one time.

"Don't lose business by not making apparent, by means of a price tag, whether your prospective customer can afford to buy the appliance.

"Don't forget that people are interested in what electricity will do for them.

"Don't hope to sell anything by using a moving device that does not accomplish something useful.

"Don't fail to change your window display every week.

"Don't offer an old type of appliance as an example. These old styles make excellent goods for reduced price and off-season sales.

"Don't fail to put signs in the window telling what the appliance will do for the prospective purchaser."

Electric Irrigation During the "Hopeless Valley" of the Central-Station Load Curve

The value of electric pumping for the irrigation of New England market gardens was emphasized at the recent convention of the local N. E. L. A. section. Eugene Carpenter of the Vineyard Lighting Company, Oak Bluffs, Mass., said that irrigation by central-station energy is contemplated for the coming season in connection with the strawberry crop. One acre irrigated will produce as much profit as three non-irrigated acres. With electric irrigation it is estimated that 90 per cent of the strawberry crop can be saved, while without this

service the farmer will do well to save 40 per cent. The best time for such service is between 11 p. m. and daylight, which is during the "hopeless valley" of the station load.

F. C. Hard of the Edison Electric Illuminating Company, Boston, said that electric pumping on the "miscellaneous energy" rate of the company has made the market gardener in the Boston suburban territory who purchases central-station energy independent of the weather. At 3 cents per kilowatt-hour the annual cost of such irrigation runs in one representative 10-acre place at from $36 to $40. A 3-hp. motor suffices, and there is a minimum meter charge of only 75 cents per month. Small single-phase motors are very useful in this work, and there is a field for the employment of second-hand leaky pipe in water sprinkling.

Does Your Customer Know About the Convenience and Possibilities of Multipoint Control of His Lamps?

In seeking more already-built houses to wire the electrical contractor must not overlook the fact that dwellings in which electricity has already been installed offer splendid opportunities for profitable wiring jobs in making extensions, installing baseboard and wall outlets, and facilitating the control of lamps through three-point and four-point switches.

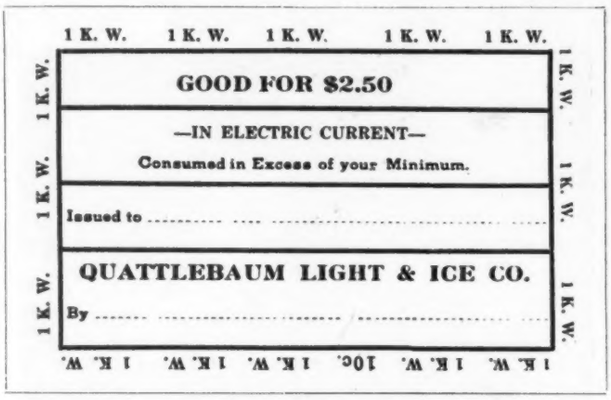
A HINT FOR THE ELECTRICAL CONTRACTOR—SOME CASES WHERE MULTIPOINT CONTROL OF LAMPS IS OF ADVANTAGE

Lamps in	First Switch at	Second Switch at	Third Switch at
Hall	Front door	Foot of stairs	First floor
Passage	Front door	Foot of stairs	Kitchen door
Corridor	One end	Middle	Other end
Staircase	Hall	Half landing	First floor
Staircase	Ground floor	First floor	Second floor
Room with two doors	First door	Second door	Fireplace or elsewhere
Room with three doors	First door	Second door	Third door
Bedroom with two doors	First door	Second door	Bed
Bedroom with one door	Door	Dressing table	Bed
Office with two doors	First door	Second door	Desk
Shop	Front counter	Back counter	Inner room
Garden	Garden door	Greenhouse or workshop	Garage
Carriage drive	House	Lodge	Garage

Few homes are there, indeed, where two or three multipoint control circuits could not be installed to the everlasting convenience of the housewife and the household. The layman, of course, knows nothing about three-point and four-point switches, and, to avail himself of these conveniences, needs in most cases only the suggestion from the contractor who can visualize the conveniences of upstairs and downstairs switches for the hall lamps, switches at the ends of corridors and halls, and at the doors of rooms entered from two or more sides, etc. Some of the possibilities in this direction are tabulated here and suggest opportunities for many desirable wiring jobs in already-wired homes.

A "Free" Electric Iron with Each $2.50 Purchase of Electric Service in Advance

The Quattlebaum Light & Ice Company of Conway, S. C., recently distributed among its customers advertisements announcing that electric irons would be given away free at a demonstration of electrical appliances to be held in the town. The gratis presentation of these electric irons was accomplished with the aid of "electricity tickets," one of which is reproduced herewith. This ticket, good for 16 kw.-hr., and applicable in payment of bills for energy consumed in excess of the customer's minimum, was sold to the customer for $2.50. To the purchaser of such a ticket an iron was given gratis, so that, from the company's standpoint, assuming the cost of the ticket to meet in whole or in large part the cost of the iron, the expense was simply the manufacturing cost of the energy to operate the iron during the first month or two of its use.



"ELECTRICITY CARD" SOLD FOR $2.50 AND ACCOMPANIED BY A FREE ELECTRIC IRON

"Baby Week" Electrical Publicity Suggests an All-Around-the-Calendar Opportunity

Nearly every establishment in Kansas City handling electrical goods participated in the opportunities of "Baby Week" by displaying items of particular use in the nursery. The Electric Shop of the Kansas City Light & Power Company was especially alert in this respect, having a window decorated for the occasion and using large space in the newspapers to call attention to the devices that, from the manner in which they were pictured and referred to, were especially designed for the comfort and protection of the baby. Included in the list of appliances featured in the "Baby Week" advertising were electric milk warmers, immersion heaters, luminous radiators, heating pads, and even vacuum cleaners—the last-named appliances being cleverly linked up with the "Baby Week" campaign in a paragraph telling how a sanitary home for baby results when a vacuum cleaner is used.

For Baby's Sake
The Greatest Handmaid for Baby—Electricity
What Baby Really Needs
The Universal Electric Immersion Heater
Electric Heating Pad Maintains Steady Heat
A Real Cheer Maker for Baby
With Cleanliness Best of All
Get Everything for Baby—Remember,
Nothing Down, Plenty of Time to Pay—at
THE ELECTRIC SHOP, 1500 Grand Ave.
Bell, Grand 50
Home, Main 50

STATION AND OPERATING PRACTICE

A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

A Winter Vehicle Used by Line Patrolmen in Snow Trails of Wisconsin and Minnesota

At St. Croix Falls, Wis., H. M. Byllesby & Company operate a hydroelectric plant which supplies a large portion of the energy used at Minneapolis and at St. Paul. The system also feeds three towns in Wisconsin and six towns in Minnesota. The lines required to

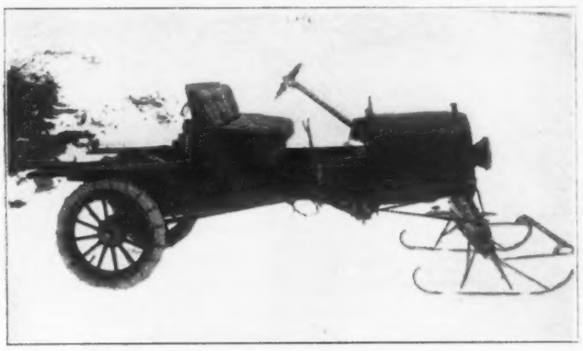


FIG. 1—CONSTRUCTION OF SLEDMOBILE FOR USE IN NARROW PATHS MADE BY SLEIGH RUNNERS

serve these communities operate at 6600 volts and are about 38 miles long. In summer automobiles are used in patrolling these lines, but this winter, owing to the unusual accumulation of snow, it has been necessary to adopt another transportation method, because the

FIG. 2—REAR OF VEHICLE SHOWING HOW NARROW-GAGE DRIVING WHEELS FIT TRACKS OF SLEIGHS

farmers in this district use bobsleds having a narrower gage than that now standardized for automobiles. The broken paths produced by the sleigh runners are very close together, and outside of these parallel trails the snow has been too soft to support the weight of a car.

To surmount the difficulty a Ford automobile has been equipped with a new rear axle drive shaft and differential. This rear axle was shortened 20 in. to make the gage of the wheels fit the sleigh tracks. A new rear spring was also fitted over the rear axle. The front axle was removed and a bolster and sled were sustituted for it as shown in the accompanying illustration. The standard body was removed, because with the narrower gage the wheels would not clear it. The body shown is of rough board construction—built for the trial trip. The sledmobile has been in such constant use since, however, that there has been no opportunity to improve the appearance of the body. This car has covered 90 miles in one day when no other means of transportation except horses was available.

A Method of Distributing Energy for Street-Lighting Installation

Lamps Energized by Series Transformers Buried in Earth and Connected by Jute-Covered Armored Cables Laid in Trenches

Aside from the engineering considerations involved in laying out the demonstration street-lighting installation in Milwaukee, Wis., outlined in the March 18 issue of the ELECTRICAL WORLD, the system is interesting because of the arrangement of distribution circuits and methods of maintaining constant current in the series circuits without employing constant-current transformers.

In laying out the distribution system the city was divided into sixty practically equal areas, each area to be served by a separate circuit. These areas are so arranged that the boundary lines come on principal streets; thus the lamps on the opposite sides will be on different circuits so that the possibility of total interruption to lighting on the main thoroughfare is remote.

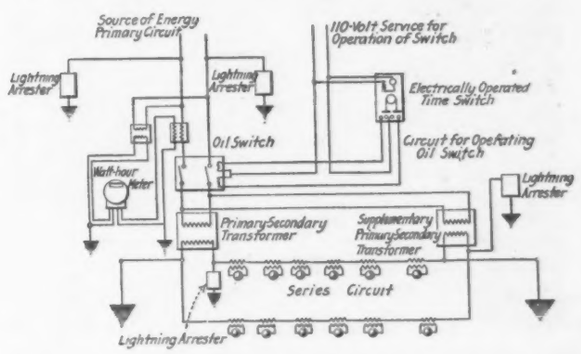


FIG. 1—DIAGRAM SHOWING METHOD OF SERVING LAMPS FROM SERIES CIRCUIT

Standard high-grade steel-taped cables with the addition of two layers of impregnated paper over the lead, two layers on the outside of the steel tape, and a jute coating over all this to prevent electrolysis, is used throughout the system. The additional paper layers are spirally wound and each layer is reversed in direction.

The cable is placed in the parkway through the major portion of the city and in grooves in the sidewalk or under the pavement in the gutter in the down-town district. In the parkway it is placed about 15 in. below the surface of the ground without any conduit or other protection, except under streets and alleys, where it is carried in 2-in. iron pipe forced under the pavement

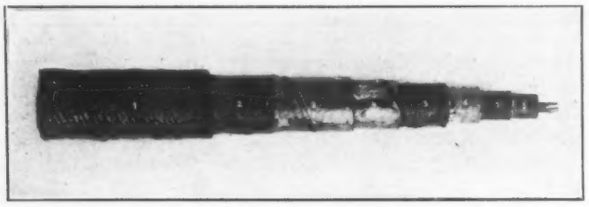


FIG. 2—CONSTRUCTION OF UNDERGROUND CABLE

The layers indicated by numerals are constructed of the following materials: 1, saturated jute; 2, two layers of impregnated felt paper; 3 and 4, steel tape 0.035 in. thick; 5, two layers of impregnated felt paper; 6, lead sheath 1/16 in. thick; 7, saturated double layer of cotton tape; 8, high-grade rubber insulation 4/69 in. thick.

without disturbing the latter by means of hydraulic pipe pushers.

A feature of the distribution system is the method of serving constant-current lamps without the use of constant-current transformers. The scheme adopted is indicated in Fig. 1. The main circuits are to be connected to the primary distribution system of the Milwaukee Electric Railway & Light Company at convenient points through primary transformers having a ratio of approximately 1:1 and a rating of approximately 16 kw. Several taps are provided on these transformers so that different numbers of lamps can be operated therefrom. To begin with, the primary transformers will operate at about 90 per cent full load, and later, when more lamps are installed in accordance with the ultimate lighting plans, other transformers will be added.

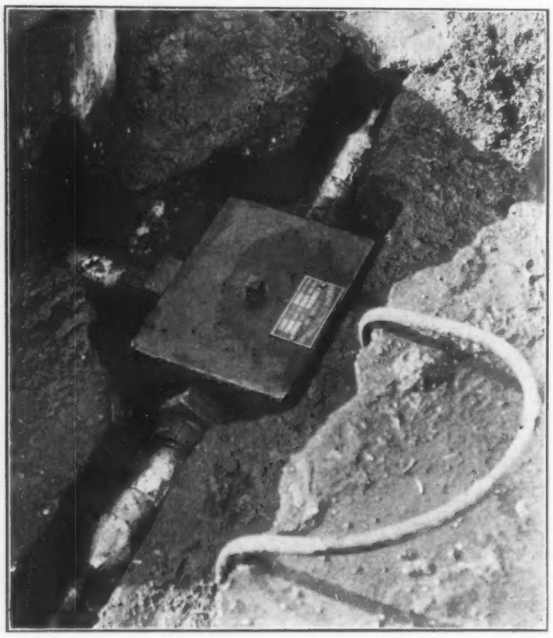


FIG. 3—LAMP TRANSFORMER INSTALLED IN GROUND AT FOOT OF LAMP POST

The secondary of each primary transformer is connected in series with the primary coils of small lamp transformers buried in the ground at the base of each post. The secondaries of these small transformers in turn are connected with their respective lamps, these circuits being designated as "tertiary" or lamp circuits and grounded on one side. Owing to the lamp transformers and the cables being buried underground, no voltage higher than that of the secondary circuit of the lamp transformer exists above ground. In no case does this exceed 40 volts.

In some instances where it is necessary to route a circuit around a parkway it is made a loop in itself and connected to the main circuit through a transformer. This is done because of the saving possible in the cable on account of the lower voltage required for the smaller number of lamps, and is a matter of balancing the cable saving against the transformer losses. If the loop is more than approximately 240 ft. long, it is cheaper to put in another transformer. When this is done, the special transformer is connected in series with the primary coils of the lamp transformers, thus making the circuit up each post the "quaternary."

The primary transformers are mounted on poles at

FIG. 4—ONE OF THE TWELVE TESTING STATIONS

convenient points, and their secondaries are connected through a riser pipe with the underground steel-taped cable. The primary side is connected to the electric-service company's distribution system through oil breakers, which protect the circuits from overloads. Provision is also made on the poles for mounting watt-hour meters and a recording voltmeter, the latter for determining if the voltage regulation is within the limits required. The primary and lamp transformers for the demonstration circuit were supplied by the Kuhlman Electric Company.

LAMP TRANSFORMER SIZES FOR VARIOUS WATTAGE LAMPS

Candle-power	Voltage, watts	Amperage
100	71	6.6
250	162	6.6
400	256	6.6
600	282	20.0
1000	450	20.0

The lamp transformers, which are a multiple-series type housed in a 6-in. by 4-in. by 6-in. pressed-steel box, are set in a concrete pocket provided beside each lighting post and are T-connected to the lamp. The space around the transformer in the concrete is then filled with compound, as is also the space inside. The lamp transformers are designed so that they will automatically compensate for lamp outages by virtue of their high no-load reactance. Thus the current in the main circuit

is maintained practically constant, even when one or several lamps burn out, without the use of constant-current transformers. The sizes of lamp transformers required for different candle-powers of lamps are indicated in the accompanying table.

The lamp transformers on all two-bracket poles contain two separate sets of coils, the secondaries of which are connected to a three-wire cable extending up the post to the lamp, thus providing a wire for each lamp and common-return circuit. This three-wire system is used in preference to connecting the lamps in series with a two-wire secondary, since it assures continuity of service from one lamp at least even if the other burns out.

By connecting the series loop circuits with the main and supplementary primary-secondary transformers and ground, as shown in Fig. 1, an open circuit occurring in one section of loop will not interrupt service in other sections. To facilitate inserting test instruments in the circuits without interrupting service Pemco circuit-opening jacks are provided inside the lamp-posts at twelve points on the demonstration circuit. Grounds, opens and other faults are located approximately by observing which lamps are burning and which are not, and then definitely by means of an exploring coil and a telephone receiver. The latter operation can be carried on from the street level since the cables are buried only 15 in. below the surface.

The Milwaukee demonstration street-lighting system was installed by Langstadt & Meyer Construction and Supply Company, Appleton, Wis.

Construction of a Cast-Bronze Basket Grip for Pulling Cable

BY IRA H. METZGER

Where a long section of heavy cable is to be pulled through a muddy duct or a duct of a bore only slightly larger than the diameter of the cable, the ordinary woven wire cable grip often fails. The reasons for its failure are that the diameter of the cable is increased by the wire of the grip and the excessive strain has a tendency to strip the lead sheath from the cable. These

FIG. 1—CABLE GRIP, SHOWING PULLING LOOP AND TAPERED END FOR SPREADING CONDUCTORS

difficulties may be overcome by using what might be termed a "basket grip," which is shown in the accompanying illustrations.

This grip may be cast of iron or phosphor bronze. The one shown here is suitable for pulling cables having an outside diameter up to 2¾ in. About 4 in. of the lead and insulator is cut away from the end of the cable, and the bare conductors are tinned and pushed up through the basket. The conductors are then spread in the upper part of the basket, which is tapered to accommodate this process, and molten solder is poured over the spread conductors. After the solder has cooled the match-hooks attached to the pulling rope are hooked through the loop of the basket, and the cable can then be drawn through the ducts. However, if the duct is wet or muddy, it is best to preclude the danger of water get-

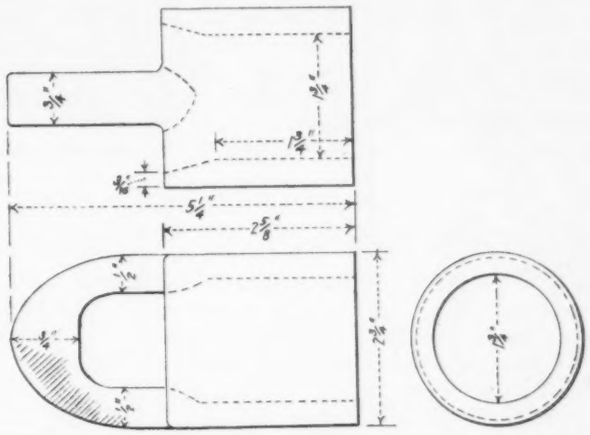


FIG. 2—CONSTRUCTION OF A CABLE GRIP SUITABLE FOR PULLING CABLES UP TO 2¾ IN. OUTSIDE DIAMETER

ting into the cable end by winding a good-quality rubber-filled tape around the lower end of the basket and the adjacent lead sheath of the cable.

If the cable to be installed is single-conductor instead of multi-conductor, the basket grip is equally adaptable. The method of procedure is similar to the above, and the cable can be prevented from slipping out of the basket by spreading the individual strands of the conductor.

How to Make an Inexpensive Boiler-Front and Stack Paint

Fred Heimlecker, engineer of the power station for the Urbana & Champaign (Ill.) Railway, Gas & Electric Company, has found that the following recipe produces a paint which is inexpensive and serviceable on boiler fronts and on power-house stacks:

RECIPE FOR BLACK POWER-HOUSE PAINT

40 gal. coaltar,	5 lb. resin,
5 gal. gasoline,	2 lb. powdered sugar of lead,
6 lb. litharge,	1 qt. or more turpentine,
6 lb. plaster of paris.	0 lb. to 10 lb. graphite.

In making up the paint the litharge and the plaster of paris are mixed with one-half the gasoline. This mixture is then added to the coaltar. Next the resin and the sugar of lead dry are mixed and sifted into the liquid mixture, and to this the turpentine is added in such quantities as are desired for slow or rapid drying. Then the graphite, which may be used to make the paint glossy, is mixed with the remaining gasoline. Finally, all of the ingredients are mixed without heat, being stirred continually during the mixing process and the stirring kept up for five minutes after the last ingredient has been added.

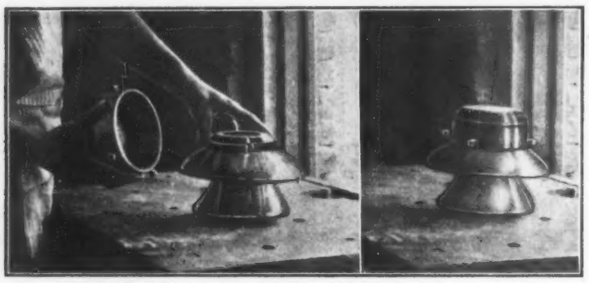
Where combination gas and electric properties are operated the coaltar can be secured easily from the gas works. The total cost of the paint in any event, according to Mr. Heimlecker, should not exceed 40 cents a gallon, a price much lower than is generally asked for other stack and boiler-front paints. At Champaign (Ill.) the same paint is also used for coating the pipe lagging, partly because it is inexpensive and partly because the black color does not show dirt.

How Metal Lath, Asbestos, Cement and Painted Canvas Were Used to Stop Air Leaks in Boiler Settings

In order to stop the rush of excess air into the furnaces under boilers in the plant of the Canton (Ill.) Gas & Electric Company, it was decided to cover the brickwork with an asbestos cement. As the best medium for holding the cement to the brickwork permanently metal lath was selected. After sections of these stamped metal pieces had been nailed directly to the brick and had been covered with a layer of the asbestos cement, the entire setting was covered with canvas. The canvas was then painted with asphaltum.

A Method of Reducing Expense of Replacing Apparatus-Supporting Insulators

When lightning arresters, knife switches and the like must be supported on insulators, the latter are usually provided with flat-topped caps which are cemented to the body of the insulator. When insulators of this construction break down, the entire unit including the cap must be discarded, making the maintenance expense relatively high. Realizing this fact, the Georgia Railway & Power Company has developed some cast-iron caps which can be readily attached to or removed from ordinary pin-type insulators, thus making it necessary to discard only the insulators when they break down, for the caps can be removed and attached to new insulators. As shown by the accompanying illustrations, the



PARTS OF REMOVABLE CAP-SUPPORTING INSULATOR AND UNIT USED BY A GEORGIA COMPANY

caps are equipped with four equally spaced radial set screws which are drawn up when the cap is set in position so that they grip two semi-circular pieces of half-round steel set in the tie-wire groove of the insulator, and thus securely attach the cap and insulator. Between the half-round steel pieces and the wire groove is placed a lead gasket, which prevents the insulator being cracked when the set screws are drawn up. This scheme of fastening caps to insulators was developed under the direction of E. P. Peck, superintendent of tests and repairs.

A New "Kick" Against Electrolysis

Complaints from water and gas companies of pipe destruction by electrolysis are familiar to central-station companies, but in Huntington, N. Y., the water-works company has another reason for objecting to return currents through its mains.

Some time ago the water company had occasion to remove a section of pipe in order to install a T-connection. The line in question passed under the tracks of the local trolley line, where no electrolytic action had been noted. Several laborers were engaged in the work, and when one section of pipe was removed, causing a break in the line, a small electric arc was drawn. The man who had hold of the pipes on each side of the break experienced a shock, and his excited language and the unaccustomed sight of the arc caused the men to leave the trench and refuse to continue the work. The difficulty was finally solved by using a section of wire fence as a jumper between the pipe ends, but considerable time was lost in persuading the laborers to return to work.

Obstacles to Installing Water-Back Overcome with Oxy-Acetylene Weld

A rather ingenious scheme was employed recently in replacing a leaky water-back at the generating station of the Leavenworth (Kan.) Light, Heat & Power Company, where the relative positions of the boilers prevented inserting the new water-back in the usual man-

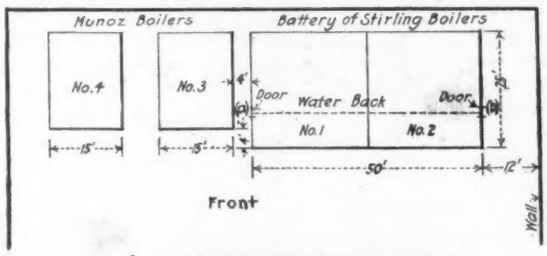


FIG. 1—RELATIVE POSITIONS OF BOILERS

ner. The boiler in which the water-back was leaking was one (No. 1) of a battery of Stirling boilers which are installed next to and only 4 ft. from the wall of another boiler (No. 3), as shown in the accompanying diagram. Removal of the defective water-back was a simple matter. It was cut in sections and taken out through the hand-hole at *a*. The proximity of boiler No. 3 and the tubes inside boiler No. 1 prevented inserting the new water-back through the same opening without enlarging it considerably, and this was objectionable. Furthermore, owing to the construction of the boiler and the use of chain grates, it was impossible to insert the new water-back through the front boiler doors since the arch *b* interfered. Cutting the new water-back in half, inserting the sections through hand-hold *a* and joining them with pipe fittings was tried, but the intense heat and the resulting expansion and contraction during the operation stripped the threads of the joint. Finally, another water-back was cut in half,

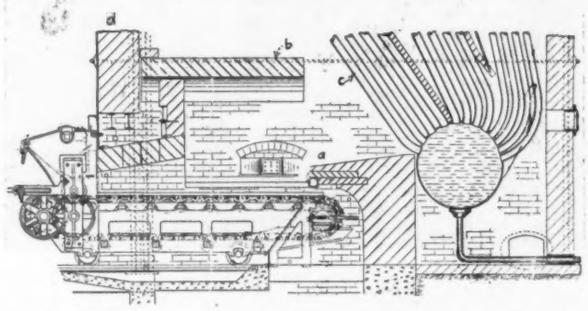


FIG. 2—OBSTRUCTIONS IN BOILER TO INSERTING WATER-BACK

inserted as before and the sections joined by an oxy-acetylene welder. This installation has now been in service for more than a month without developing any defects, which seems to indicate that the welded joint solved the problem. This method of installing the water-back was devised by Walter Schwerin, superintendent of the plant.

ADVANCE IN TECHNICAL THEORY AND PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

Illuminating Engineering in Germany

A Report of the Annual Meeting of the German Illuminating Engineering Society—Objective Photometry with Photoelectric Cells—Scope and Improvements of Illuminating Engineering

THE second annual meeting of the German Illuminating Engineering Society was recently held at the Reichsanstalt in Charlottenburg near Berlin, and the official report of the proceedings is published in the *Elektrotechnische Zeitschrift*, Jan. 13 and 20, 1916. President Warburg and all the other officers were reelected as it was pointed out that any changes during war times were undesirable. The society has now 250 members.

Hagen presented the report of the committee on the candle-power unit. The first endeavor of this committee has been to find out exactly the means by which in France, England and the United States the unit of a candle-power is maintained constant. In the discussion Warburg said that the present light units can be considered only as tentative, and that it will be desirable to replace them by rational units. One proposal has been to base the unit of candle-power on the radiation from a "black body." This means essentially that the temperature is to be fixed and rendered reproducible. In consideration of the metallic-filament lamps a high temperature of 2000 deg. C. must be chosen. To fix the temperature Lummer and Kurlbaum's method has been used, by which the total radiation is reduced by an absorbing medium to a certain fraction. It has been found that at 2000 deg. C. a temperature increase by 1 deg. corresponds to an increase of candle-power by 0.5 per cent. If it is specified that the candle-power should be reproducible within 0.5 per cent, the temperature must be reproducible within 1 deg. C. This has been accomplished. The investigations are being continued and a new type of "black-body" radiator is being developed.

Brodhun presented the report of the committee on measuring methods. With respect to the rating of lamps there was a great difference of opinion between the members of the committee, but finally the following agreement was reached: A lamp may be rated either according to the mean spherical candle-power or the mean lower hemispherical candle-power or the mean horizontal candle-power, but in every case it must be clearly stated which of the three candle-powers is meant. From a purely physical viewpoint the mean spherical candle-power is the most important, but for practical reasons it has so far been inadvisable to give up entirely the other two candle-powers. The committee proposes that whenever the mean horizontal candle-power or the mean lower hemispherical candle-power is given the conversion factor should also be stated by which the mean spherical candle-power can be found. With respect to a second subject before the committee—that of a standardizing method of measuring illumination—there was also a similar discrepancy of opinion. Some prefer measurements of horizontal illumination and others vertical illumination, and it must also be decided at what height over the ground the illumination is to be measured, etc. A third subject before the committee is automobile lighting. In the discussion Warburg stated that standardization rules are useful only if they are generally accepted, and it has therefore been decided to ask the secretaries of the German Association of Gas Engineers and of the German Association of Electrical Engineers to co-operate with the committee.

Two lectures were presented at the meeting, the first by Voege on recent improvements in "objective photometry" by means of photoelectric alkali cells and their application to photometric measurements. Such cells have proved useful in the laboratory whenever a series of tests have to be made with the same lamp. These photoelectric cells are now on the market in Germany at the price of $14. Compared with each other these cells still show differences in spectral sensitiveness, so that for each cell a special filter would be strictly necessary, but for the comparison of similar lamps, such as electric incandescent lamps or incandescent gas lamps, a filter which permits only the passage of green, yellow and red is sufficient in practice. Directions for the use of these cells were given. The author's final conclusion was that the photoelectric alkali cell has proved so far quite satisfactory and should be valuable in photometry. In the discussion Warburg thought that great caution is still necessary in the use of these cells.

The second lecture was held by Lummer, who spoke on "aims and limitations of illuminating engineering and new methods for the determination of temperatures of bodies which follow the radiation laws, and especially the sun." From experimental and theoretical considerations he concludes that a higher economy than 53 hefner candles per watt is impossible for any source of light. For carbon the maximum of economy is 8 hefner candles per watt, which is reached at 6750 deg. absolute. For tungsten the maximum economy is 9.2 hefner candles per watt and is reached at 5900 deg. absolute. It cannot be surpassed, since with increasing temperature the surface brightness increases but ratio of the same to total radiation decreases.

There are different purposes of illuminating engineering. The first would be to use a radiator which follows the radiation laws and operate it at as high a temperature as possible. A second aim would be to devise an "ideal radiator" which radiates only rays of wavelights within the visible spectrum. A third aim would be to devise a "maximum ideal radiator" which does not give white light, but yellow-green light of that part of the spectrum for which the sensitiveness of the eye is a maximum.

Generation, Transmission and Distribution

Equipment and Protection of Outdoor High-Tension Substations.—L. LINDLEY THOMPSON AND S. AUSTEN STIGANT.—After referring to the advantages of outdoor substations and the districts to which they are suitable, the authors deal with the various types that are available and with the details of equipment. The points that are particularly discussed are the protection of plant against the effects of weather and protection against lightning discharges. In conclusion, some figures are given of cost.—London *Electrician*, Feb. 11, 1916.

Power-Factor Diagram.—C. J. M. CONSTANCON.—The author gives a diagram for finding the power-factor of a three-phase system from two wattmeter readings, explains how the diagram is used, and gives its theory.—*Transactions South African Inst. Elec. Engrs.*, December, 1915.

Generators, Motors and Transformers

Wave-Shapes Obtaining with Alternating-Current Generators Working under Steady Short-Circuit Conditions.—A. E. CLAYTON.—The paper deals in detail with the action of single-phase and polyphase alternators under short-circulit conditions. Both salient-pole and cylindrical-rotor alternators are considered. Oscillographic records are given taken during short-circuit tests at normal full load current. For a salient-pole, three-phase machine with cylindrical rotor the curves are reproduced in Fig. 1. Curve 1 shows the emf. induced in a search wire placed axially along the armature surface; curve 2 the armature current; curve 3 the exciting current; curce 4 the potential difference between the excitation slip-rings of the alternator. The four records were taken on the same film by means of separate exposures. The records simply give the wave-shapes and not the relative phases of the various functions. The great effect of the armature magnetomotive

FIG. 1—CURVES FOR SALIENT-POLE, THREE-PHASE MACHINE WITH CYLINDRICAL ROTOR

force upon the flux is made obvious by the importance of the ripples due to the spacing of the rotor winding. The reactance of machines of this type is small, and the ratio of the normal excitation magnetomotive force to the normal armature magnetomotive force is low. As a result the fundamental harmonic of the armature magnetomotive force is but slightly smaller than that of the main magnetomotive force. The relative amplitudes of the first, third, fifth, seventh and ninth harmonics for the emf. wave are in the ratio of 100 to 375 to 132 to 73 to 110. The analysis of the curves shows the striking manner in which the importance of the higher harmonics is increased owing to the great reduction in the value of the fundamental. The paper is to be concluded.—From the *Journal* of the (Brit.) Inst. Elec. Eng., reprinted in abstrat in London *Electrician*, Feb. 25, 1916.

Inclosed Cadmium-Vapor Lamp.—H. J. S. SAND.—A brief abstract of a British Physical Society paper. The lamp is similar in general principle to the well-known mercury lamp. It is constructed of quartz glass. To start it the metal is melted by means of a Bunsen burner and the arc struck by tilting. Before introduction into the lamp the metal is freed from oxide and dissolved gases by a special process of filtration while at the pump. It is prevented from adhering to the glass, which might lead to fracture, by the presence of a small amount of a loose powder in the lamp. The lamp gives a powerful light, and once started will continue burning indefinitely. —London *Electrician*, Feb. 25, 1916.

Rating Incandescent Lamps.—ERNST SALOMON.—A long translation in abstract of his German paper, abstracted some time ago in the Digest, in which he advocates the rating of incandescent lamps according to watts.—London *Electrician*, Feb. 25, 1916.

Installations, Systems and Appliances

Russia.—J. VICHNIAK.—After introductory notes on the commerce of Russia with other countries, the author gives statistical tables and diagrams on the imports into Russia of products of the electrical industry before the war. He then discusses how far a home electrical industry has already been developed in Russia, why there is a preponderance of German electrical products on the Russian market, and in what respects France has been behind in electrical imports to Russia, and suggests some remedies.—*La Revue Elec.*, Jan. 7, 1916.

British Electricity Supply Statistics.—The annual statistical table of British electricity supply undertakings, giving in twenty-five columns concise data on the history, generating equipment, distribution system and rates charged for 564 supply stations in the British Isles. The number of stations which are supplied in bulk has increased to eighty-one. The stations having a plant capacity below 100 kw. now reach a total of seventy-six. There has been a large increase in the number of stations using gas or oil. Eighty-seven stations are using gas plants and fifty-four are using oil engines. A second table gives information on sixteen electric power companies.—Supplement to London *Electrician*, Feb. 18, 1916.

Electric Welding.—The conclusion of the long illustrated serial giving practical notes on electric welding. In the present installment "after-work" after the completion of an electric weld is discussed, and finally current supply, regulation and consumption are dealt with. "An immense variety of electric machines are now available to meet practically any needs. One or other of the basic systems—arc, resistance or percussive welding—is employed in each case, the distinction between the innumerable machines operating in each system lying in such important mechanical details as jaw opening and closing gear, upsetting mechanism, contact cooling, and general arrangement of controls. The art and science of electric welding have been brought to such perfection that there are few metal-using industries in which electric welding does not or could not find very advantageous application."—London *Elec. Review*, Feb. 18, 1916.

Wires, Wiring and Conduits

Testing of Underground Cables with Direct Current.—An account of the discussion which followed the paper by O. L. Record recently abstracted at length in the Digest. B. Welbourn said that tests at the works on alternating-current cables should be alternating-current tests and the cables should be tested for dielectric hysteresis, but after laying it was necessary to ascertain that the cables had not been mishandled; the joints should be tested, and that was where the direct-current test might find great application. A. P. Trotter said that it had been the nominal custom to test for half an hour; that it was open to doubt whether the half-hour was really wanted, but that Major Cardew thought it should not be diminished. A test at the working pressure plus 10,000 volts allowed no margin of safety. Ordinary surges beyond that might occur any day. F. C. Raphael said that in his own experience there was no need to test very long cables joined up—they could be divided into sections. The satisfactory testing of a cable after laying was not hopeless. He thought the best solution was Beaver's proposal to use a cable with a metal sheath a little way under the lead and separated by a thin layer of insulation. If the lead were affected or the cable flattened, that insulation would break down. That naturally increased the cost of the cable. It was

possible that there might be a saving of money by employing zinc for the sheath. Record's apparatus would come in frequently for testing cables when alternating-current apparatus was not available and before Beaver's sheath method was universally used. E. A. Watson described a development of the influence machine principle which he had been working on. It was an attempt to test a large cable at 150,000 volts with direct-current with such a machine. They had runs of 130,000 volts for half-an-hour or so, but the machine broke down by the general disintegration of the ebonite. Several speakers said that the use of direct current for testing cables was not new but rather old.—London *Electrician*, Feb. 18, 1916.

Electrophysics and Magnetism

The Effect of Electric Oscillations on the Magnetic Properties of Iron Investigated by the Campograph.—J. A. FLEMING AND P. R. COURSEY.—The authors discuss the effect of electric oscillations on the magnetic hysteresis of iron, while at the same time a slowly varying magnetic cyclical force acts on the iron. Broadly and generally, the effect is as follows: When the cyclical magnetic force has a small maximum ($H = 1$ about) the effect of either superimposed damped or undamped oscillations of high or low frequency is to increase the hysteresis loss and to promote or increase the magnetization at the extreme ends of the cycle. If, however, the cyclical force has a larger maximum ($H = 8$ or more), then the general result is to diminish the hysteresis loss. Except in the case of strong currents (10 amp. to 20 amp.) sent along the wire, the general effect of either longitudinal or circular alternating magnetizing force, damped or undamped, is to increase the magnetization at the ends of the cycle. Experiment shows that mechanical shocks or vibrations act very much in the same manner. The results of the authors may be used for explanation of the action of magnetic detectors in wireless telegraphy.—London *Electrician*, Feb. 25, 1916.

Cathode Fall with Glow Currents in Oxygen and Nitrogen.—W. NEUSWANGER.—Skinner's theory of the so-called cathode fall in gases which gives a general relation between the fall, the current density, the mean free path of the electron and the distance from the cathode to the point of minimum potential gradient in the negative glow has been corroborated in a series of experimental results with hydrogen. The purpose of the present author's investigation was to make a similar experimental study of the cathode fall in oxygen and nitrogen. He found for each of the different gases, hydrogen, nitrogen and oxygen, that all pressures giving the normal cathode fall have the same number of mean free paths to the point of minimum potential gradient in the negative glow and have a normal current density proportional to the square of the gas pressure. With normal current density the cathode fall is a minimum. As the current density is increased the immediate cathode fall also increases, but the fall over the remaining distance to the negative glow decreases. This decrease in the gas is due to the higher ratio of the electron current from the cathode to the total current, which reduces the distance from the cathode to where the negative charge in the gas equals the positive. Finally, the difference in potential between the cathode and any point at a definite number of mean free paths from it is a function of the product of the current density into the square of the mean free path of the electron, i.e., a function of the ratio of the current density to the square of the gas pressure.—*Phys. Review*, February, 1916.

Thermo-Electricity.—A. E. CASWELL.—From the value of the thermo-electric power, or that of the Peltier emf., between two metals and well-known physical constants the ratio of the concentrations of the electrons in the two metals which take part in the phenomena of thermo-electricity can be determined. These electrons are identical with those which take part in the conduction of electricity and heat in metals. The conductivity ratios of two metals are equal to the ratio of the products of the mean free path and the concentration of the electrons. From the ratios just mentioned it is possible to determine the ratio of the mean free paths of the electrons in the two metals.—*Phys. Review*, February, 1916.

Terrestrial Magnetism—C. CHREE.—His Kelvin lecture delivered before the (British) Institution of Electrical Engineers on Lord Kelvin and terrestrial magnetism. The author discusses in succession the secular change, the diurnal variation and the magnetic disturbance.—London *Electrician*, Feb. 25, 1916.

Electrochemistry and Batteries

Baking Carbon Electrodes.—A note of a recent British patent (No. 3443, 1915) of G. Mendheim for a method of baking molded carbon electrodes in which the tar vapor evolved is employed as fuel for the baking process.—London *Elec. Eng'ing*, Feb. 24, 1916.

Telegraphy, Telephony and Signals

Increasing the Traffic Capacity of Telegraph Lines by Acoustic Tuning.—A fuller illustrated description of the multiplex telegraph system of Oscar Srnka noticed more briefly some time ago in the Digest from an Austrian paper. He uses alternating currents of different frequencies on the same line and tunes each receiving station to one special frequency. The sender, receiver and auxiliary apparatus at each station are connected in series with each other and with the line, and to each station is allotted, for reception purposes, a definite alternating-current frequency. The frequencies are kept between 600 cycles and 1100 cycles per second. With a difference of fifty cycles (*i.e.* 600,650, etc.), eleven stations per line are possible between these limits, and if this be not sufficient, fourteen stations can be operated by reducing the difference in frequencies to forty cycles. As receiver a "monotelephone" is used, as shown in Fig. 2. A steel membrane *m* (1 or 2 mm. in thickness) rests on three fine points set 120 deg. apart round the nodal line of the fundamental wave—*i.e.*, on a circle of diameter equal to 0.68 multiplied by the diameter of the membrane. A powerful magnet *M* has an iron core *K* carrying a fine wire winding *s* of 200 ohms to 400 ohms resistance. The core *K* is hollow, and to it is connected a forked tube *r* leading to the telegraphist's headpiece receivers. The operator's hands are left free, and the monophone is protected by a glass bell jar. The membrane supported as shown in Fig. 2 responds freely only to its natural frequency, which depends on the diameter of the membrane and remains constant during life. The tuning of the receiver is therefore entirely mechanical. To eliminate the necessity for a head-piece receiver, a loud-speaking monophone may be built on the principle illustrated in Fig. 3, using two membranes actuated by two magnets and supported respectively on cork and on steel points, the lower membrane being drilled to admit the pins carry-

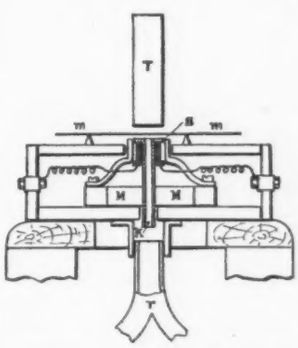


FIG. 2—"MONOTELEPHONE" RECEIVER

ing the upper membrane. A horn with telescope tube for acoustic tuning and a thin elastic diaphragm for dust-exclusion complete the apparatus. When a permanent record of messages is required, a mono-frequency relay, in combination with a differential relay, operates a printer, the arrangement being as shown inside rectangle (*1*), Fig. 4. In this diagram *m* represents a monophone membrane (as in Fig. 2), actuated by the relay coil *s*. A nickel-silver contact-plate at the center of *m* makes contact with a rounded contact piece on a light and delicately pivoted lever *h*. The latter is counterweighted, so that it has a frequency of swing slightly lower than that of *m*, but does not affect the natural frequency of the latter. During idle periods the adjustable spring *f* (fitted with a felt pad) holds the lever *h* lightly on to *m* so that a closed circuit is maintained between the points *a b* and the differential relay *R* keeps the position shown. When, however, a signal sets *m* swinging, the lever *h* is not able to keep exactly in step, its contact with *m* becomes imperfect, and the relay *R*, therefore, closes contact 2 and so completes the local printer circuit $B_2 w_2$, and the signal is printed on *P*. Adjustment is effected by a screw setting the position of *s*, or by shunting the coils of the latter; the relays are placed under a dust-tight cover and mounted on a rubber block to absorb external vibrations. By adding a resonance tube the monophone relay can be adapted for audible reception as well as, or instead of, giving a printed record; when receiving by sound the printer is stopped and the switch *S*,

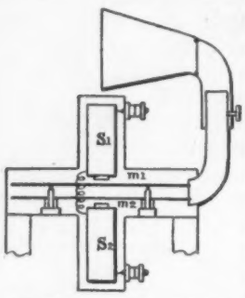


FIG. 3—DETAILS OF LOUD-SPEAKING MONOPHONE

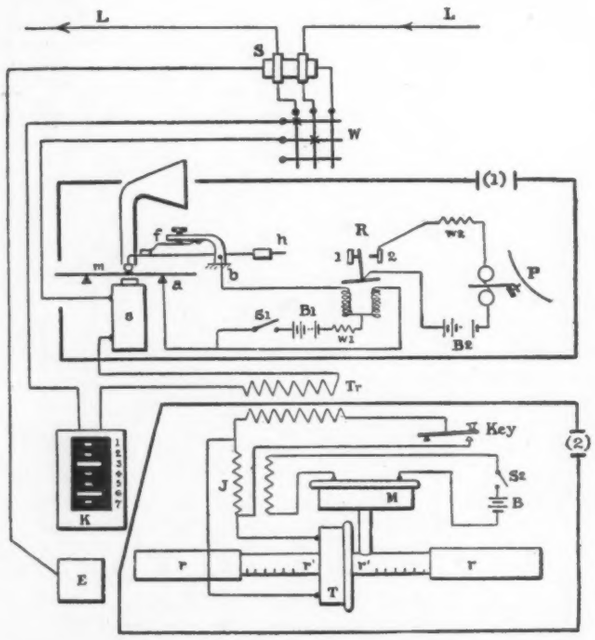


FIG. 4—DIAGRAM OF MONO-FREQUENCY RELAY AND DIFFERENTIAL RELAY COMBINED

opened. The Larsen acoustic variable-frequency alternating-current generator is used in the transmitter. It yields a nearly sinusoidal current, and therefore sets up clear musical tones in air. In the rectangle (2), Fig. 4, a singing telephone *T* is provided back and front with tubes *r'* over which slide tuning tubes *r;* the telephone is coupled electromagnetically to a microphone *M* by the induction coil *J*. By varying the setting of the tubes, the frequency of the alternating current is controlled; for any particular setting the frequency of the current delivered by the secondary of the induction coil is constant within a fraction of 1 per cent, and falls normally between the limits 600 cycles and 1100 cycles per second, but can be made higher if there is a specially large number of stations on the line. The positions of the tubes *r* corresponding to predetermined frequencies are naturally determined once for all and marked on the tubes themselves. Fig. 4 as a whole, shows the complete layout for an intermediate station. The through-line *L* is connected, via the lightning protector *S*, to the change-switch *W* and the station apparatus.—London *Elec. Review*, Feb. 25, 1916.

Telephone Cables.—A note on a recent British patent (No. 1346, 1915) of K. W. Wagner. Insulating materials, such as "gutta-gentzsch," containing little resinous matter, are used instead of gutta-percha in cables for loaded telephone circuits to reduce the dielectric loss and thereby reduce the damping.—London *Elec. Eng'ing*, Feb. 24, 1916.

Long-Distance Radio-Transmission.—LOUIS COHEN.—The author first refers to the formula by Austin and the theoretical formula connecting the received unit with the distance. He then suggests another formula involving a reflection coefficient. The three formulæ are compared with observed results.—London *Electrician*, Feb. 25, 1916.

Propagation of Wireless-Telegraph Waves.—H. NAGAOAKA.—An article on the hypothesis of a reflecting ionized layer in the atmosphere above the surface of the earth which permits electric waves to travel between the ionized layer and the earth without great loss of energy around the earth. By means of diagrams the effect of sunrise and sunset is explained.—London *Electrician*, Feb. 25, 1916.

Book Reviews

EXAMPLES IN MAGNETISM. By Prof. F. E. Austin. Published by the author at Hanover, N. H. 90 pages, 27 illus. Price, $1.10.

This little book of ninety pages begins with the foundation theorems of trigonometry and mechanics which are necessary to a proper understanding of any branch of physics. Besides valuable notes on the properties and uses of permanent magnets, the author has selected twenty-three typical examples in magnetism which are fully worked out and which are followed by a number of problems designed to test the knowledge of the student and his skill in applying it. The work will be of special value by way of review to students who have covered the subject in their college course.

TASCHENBUCH FÜR MONTEURE ELEKTRISCHER BELEUCHTUNGS-ANLAGEN. By von Gottlob Lux and Dr. C. Michalke. Munich and Berlin: R. Oldenbourg. 298 pages, 213 illus. Price, 3 marks.

The fiftieth edition of a very simple, practical little handbook on electric-lighting installations, suitable for the use of dynamo men, electrical inspectors, artisans and the intelligent class of workmen engaged in electric-lighting service. The first edition made its appearance thirty years ago. The main sections of the book relate to general principles, machines, storage batteries, apparatus, lamps, conductors, tests and general recommendations. The descriptions are clear and simple. Only a few very simple algebraic formulas appear. The book will commend itself to electric central-station men familiar with the German language and types of apparatus.

GERARD SWOPE

Men of the Industry

Changes in Personnel and Position—Biographical Notes

Gerard Swope, who has been appointed chairman of the campaign executive committee for the celebration of "America's Electrical Week" next December, is vice-president and general sales manager of the Western Electric Company, New York City. Mr. Swope is a graduate of the class of 1895 of the Massachusetts Institute of Technology, Boston, and upon leaving school entered the employ of the Western Electric Company at Chicago. After a year spent in various departments of the shops, in 1896 he entered the power-apparatus engineering department as designing engineer. In 1901 he organized and was the first manager of the St. Louis office of the Western Electric Company, and in 1906 was transferred to Chicago as power apparatus manager, in charge of the sales, manufacturing and engineering of the power-apparatus business of the company. In 1908 Mr. Swope became general sales manager, with offices at New York.

Prof. Elihu Thomson is receiving the heartfelt sympathy of his friends throughout the engineering and scientific world upon the death of his wife, which occurred at the family home in Swampscott, Mass., March 19. Besides her husband, Mrs. Thomson leaves four sons, three of whom are engaged in electrical work.

Frank T. Wyman has severed his connection as chief engineer of the Pittsburgh Transformer Company, Pittsburgh, Pa., to accept the position as chief engineer of the Packard Electric Company of St. Catharines, Ont. Mr. Wyman is a graduate of the University of Vermont. After leaving school he spent two years teaching electrical engineering at Drexel Institute in Philadelphia and two years teaching electrical engineering in the University of Pittsburgh. For the past seven years Mr. Wyman has been connected with the Pittsburgh Transformer Company.

W. F. Parker, who for the last five years has been sales engineer for the Packard Electric Company of Warren, Ohio, now holds the newly created position of sales manager of the company. Mr. Parker was graduated from the electrical engineering school of the Armour Institute of Technology at Chicago in 1904, and in 1908 he received the degree of electrical engineer from the same institution. Upon leaving school in 1904 he was employed by the operating department of the Commonwealth Edison Company, the Holtzer-Cabot Electric Company and the Chicago Telephone Company. Until his connection with the Packard company he was electrical engineer for the city of Chicago under W. C. Carroll, who at that time was the city's commissioner of gas and electricity.

Sydney O. Swenson, who has become a member of the engineering offices of Putnam A. Bates, New York City, has for the last four years been electrical engineer for the Kansas City Terminal Railway Company, having charge of all electrical work pertaining to the new Union Station and its terminal facilities. From August, 1907, to July, 1911, Mr. Swenson was assistant electrical engineer of the Detroit River Tunnel Company, and was engaged on engineering work in connection with the electrification of the Michigan Central Railroad at Detroit, Mich., and Windsor, Ont. Prior thereto he was with the New York Central & Hudson River Railroad Company for two and one-half years on the electrification of its New York terminal, and from June, 1899, to March, 1905, he was a member of the engineering department of the Commonwealth Edison Company, Chicago.

O. R. HOGUE

Oliver R. Hogue, chairman of the committee on industrial and yard lighting of the Lighting Sales Bureau of the National Electric Light Association, has just been appointed chairman of the registration committee for the N. E. L. A. convention to be held at Chicago May 22 to 26. Mr. Hogue is head lighting agent for the Commonwealth Edison Company, Chicago, and for years has devoted particular attention to street illumination and interior-lighting problems.

W. N. RYERSON

W. N. Ryerson, general manager and chief engineer of the Great Northern Power Company of Duluth, Minn., which has developed the interesting load-factor conditions described on page 697 of this issue, is a graduate of Columbia University, and received his early experience in New York City, where for three years he was electrical superintendent of the main generating station and superintendent of substations of the Interborough Rapid Transit Company. From 1905 to 1909 Mr. Ryerson acted as superintendent in charge of the construction, operation and commercial departments of the Ontario Power Company, Niagara Falls, Ont., and in the year last mentioned moved to Duluth to take over his present work. Since 1906 he has also conducted an independent consulting engineering practice. Mr. Ryerson has been an active committee worker for the N. E. L. A., the A. I. E. E. and other societies, and was for two years president of the Canadian Electrical Association.

Obituary

Dr. Charles J. H. Woodbury, for thirteen years assistant engineer of the American Bell Telephone Company, and a well-known authority on mill construction, fire hazards and textile affairs, died at his home in Lynn, Mass., on March 20.

John C. Manley, assistant construction superintendent of the Commonwealth Edison Company, Chicago, dropped dead at noon March 17, while playing handball in a gymnasium. Mr. Manley was born in 1869 and had been with the Commonwealth Edison Company and its predecessor, the Chicago Edison Company, since June, 1895, beginning as a wireman. He was one of the most popular men in the company, and his death came as a great shock to many. Always quick-thinking and enterprising, Mr. Manley was selected to direct many special jobs of wiring. Thus he headed the delegation sent by the Commonwealth Edison Company in response to the appeal from Dayton for help at the time of the great flood three years ago. Mr. Manley was a man of considerable inventive ability, and a number of improvements in electrical wiring are attributed to him.

NEW APPARATUS AND APPLIANCES

A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

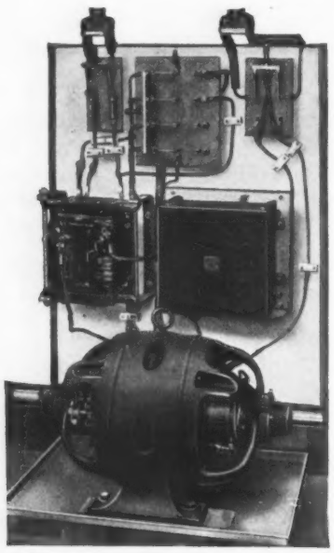
Rotating Converting Apparatus for Motion-Picture Arcs

The wonderful popularity of the moving-picture theater has resulted in the development of certain electrical appliances along special lines for motion-picture work. Only a few years ago, 25 amp. to 30 amp. of current was

EXPLODED VIEW OF THE "WOTTON" TWO-LAMP OUTFIT MADE BY THE ELECTRIC PRODUCTS COMPANY, CLEVELAND, OHIO

deemed sufficient for the projection arcs, and alternating current was used in many instances.

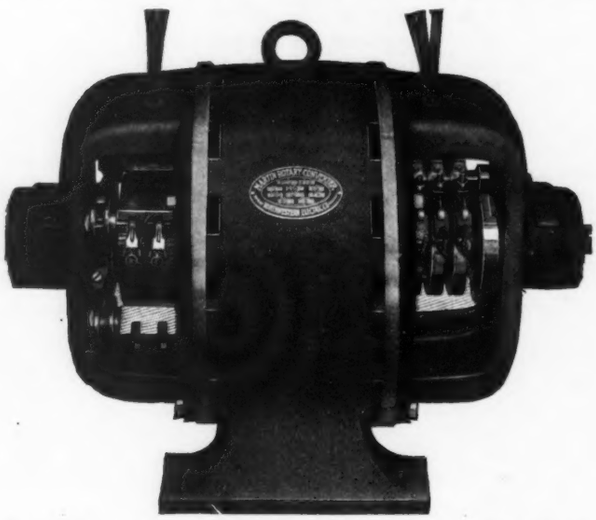
Competition, however, has now resulted in larger houses, better films, and the modern feature photo-play requiring more light of a better quality. Larger houses require bigger screens and longer "throws," which again call for greater lamp candlepower to secure



CONVERTER OUTFIT DEVELOPED BY THE WAGNER ELECTRIC MANUFACTURING COMPANY, ST. LOUIS, MO.

satisfactory projection. Exhibitors soon realized that with alternating-current arc lamps, true color values could not be obtained, and to even approach the requirements for proper projection direct current was found to be necessary. When one realizes that 60 amp. to 70 amp., alternating current, develops only 4700 cp. to 5000 cp. in the arc, one can appreciate how necessary it is to have a proper means of producing direct current from an alternating-current supply. Photometric tests show that three times as much light can be obtained from the same number of watts using direct current, compared with alternating current, and, aside from the steadier and brighter light, it is actually cheaper to use direct current than alternating current.

The majority of large theaters to-day are equipped with screens measuring 12 by 14 ft., and the average throw is about 120 ft., using direct current; first-class projection can be obtained with 50 amp. at 55 volts, the lamp being trimmed with a $\frac{5}{8}$-in. solid lower electrode, and a $\frac{3}{4}$-in. cored top electrode. Theaters are usually equipped with two projection machines, and the present-day features require the dissolving of one picture into the other without a perceptible break in the light. It is desirable that means be provided whereby one lamp can be heated up before "dissolving" or starting opera-



"MARTIN" ROTARY CONVERTER MADE BY THE NORTHWESTERN ELECTRIC COMPANY, CHICAGO, ILL.

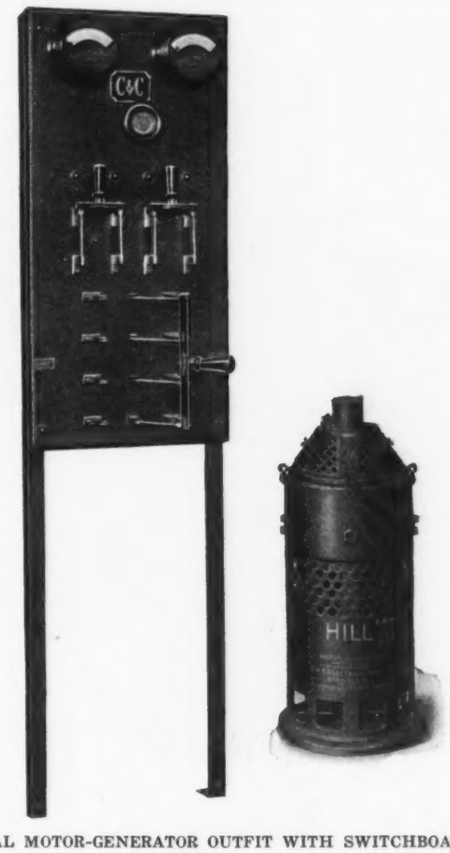
tion of the next projector. To properly accomplish this the outfit should be provided with a variable resistance in each arc circuit.

There are a number of different types of apparatus on the market for converting alternating current into direct current, each of which has its particular merit, but local conditions govern to a great extent the type of apparatus that can be used. One of the first popular forms of rectifier was the mercury arc. Now mechanical rectifiers in the form of synchronous converters or motor-generator sets, are also coming into popular use, and a number of machines are now manufactured especially for motion-picture service, as shown in the accompanying illustrations. Where there is sufficient space either in a basement or a separate room, the synchronous converter, or motor-generator set, gives excellent results.

The usual practice is to wind both synchronous converters and motor-generator sets for a pressure of 75

volts to 80 volts, and some of the manufacturers provide an extra switch which when closed causes the compound winding and all the dead resistance to be cut out, so that the machine operates on one lamp as a shunt-wound generator, at from 50 volts to 55 volts, and when it is necessary to dissolve by opening this switch, the compound winding raises the generator voltage to 75 or 80, and the resistance in each circuit holds the current down to the proper value and permits the operation of two lamps during the period of dissolving, without a perceptible difference in the light.

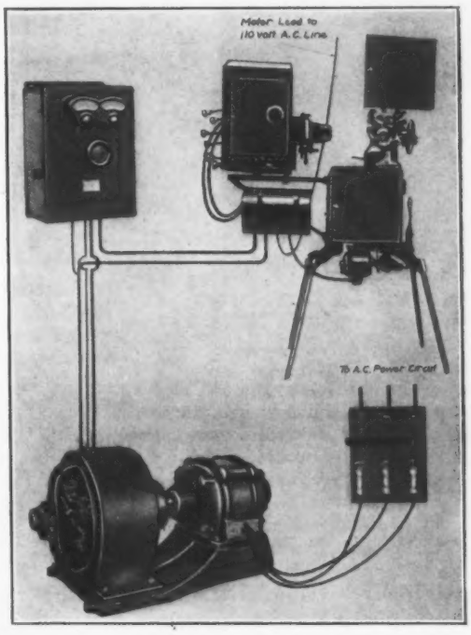
For theaters where suspended booths are used space is usually limited, and vibration and noise is an objectionable feature. Usually such theaters are without basements or other places to install a converter, and to meet the demands of these theaters, as well as to provide a machine that is under the supervision of the operator, several vertical ball-bearing machines have been placed on the market. Usually the switchboard apparatus is over or near the machine. These machines are installed in the booths. The machine, to be satisfactory, should meet the following specifications for the average house: Have a capacity of at least 50 amp. continuously, at 55 volts, and be capable of intermittent operation at 80 amp. to 100 amp. and 75 volts to 80 volts, during the period of dissolving. The machine should take up as little space as possible, should be semi-inclosed to protect it against mechanical injury, should be provided with commutator and brushes of ample size, and should



VERTICAL MOTOR-GENERATOR OUTFIT WITH SWITCHBOARD MADE BY C. & C. ELECTRIC & MANUFACTURING COMPANY, GARWOOD, N. J.

not commutate more than 35 amp. per square inch of brush surface. A fixed point of commutation is desirable, and the machine should be of the forced-ventilation type. When operating as a shunt machine, the efficiency should be high. The rise in temperature of windings should not exceed 45 deg. C. above the surrounding atmosphere, and the temperature of the commutators should not rise more than 50 deg. C. above that of the surrounding atmosphere after a continuous run of ten hours.

The machines should be well balanced and operate free from noise and vibration. Ball-bearings are desirable. The machines should also be equipped with a switchboard including a voltmeter reading from 0 volt



ONE-LAMP MOTOR-GENERATOR OUTFIT MADE BY THE FORT WAYNE DEPARTMENT OF THE GENERAL ELECTRIC COMPANY

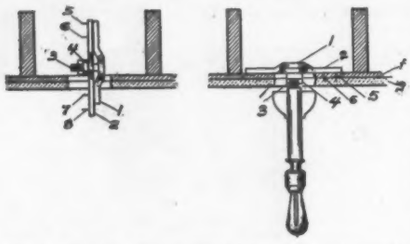
to 80 volts, an ammeter reading from 0 amp. to 100 amp., 75-amp. two-pole generator switch, without fuses, two-pole 75-amp. switch to cut out compounding and resistance in arc-lamp circuits and one three-pole 50-amp. double-throw starting switch for alternating-current motor. Where the dissolving feature is not absolutely essential, a shunt-wound machine can be used with good success. With a little practice the operator can "steal" the light from one lamp to the other with hardly noticeable effect on the screen by drawing a long arc at the end of a film; by striking the arc on the second lamp (operating a shunt-wound machine) the voltage is momentarily killed, the first light goes out, and the second lamp establishes an arc as soon as the carbons are separated. Operating in this manner a smaller set can be used. Another advantage of operating the machine as shunt-wound is that its constant characteristics permit the carbons to burn longer without adjustment, and the arc is less noisy.

Compound for Frosting Lamps

"Etch-o-lite" is a new compound recently placed on the market by the Union Electric Company, Pittsburgh, Pa., for permanently frosting incandescent lamps, automobile headlamps, signs, etc. It is in the form of a paste and it is claimed that it will not rub or wash off, has no poisonous fumes, will not burn one's hands and will last as long as the lamp lasts. A lamp is frosted by dipping into the compound for five seconds and after removing, allowing the excess material to drip back into the container. Ten pounds of this material is sufficient, it is declared, to frost from 1200 to 1500 lamps. The compound is packed in 5-lb. and 10-lb. cans.

Fixture Attachment

A fitting which has been designed to comply with Rule No. 24-E of the National Electrical Code which requires that fixtures must be supported by wooden blocks screwed to lath, or by



FIGS. 1 AND 2—FITTING BEING INSERTED IN HOLE IN PLASTER AND IN PLACE

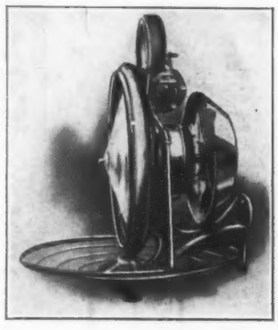
other suitable approved fittings has been developed by the Elandee Construction Company, 4305 North Lawndale Avenue, Chicago, Ill., and is shown herewith. The device is a collapsible support for conduit boxes for use where no solid material such as gas stems or joists is obtainable for supporting fixtures on the ceiling or sidewalls.

In Fig. 1 the device is shown as it is being inserted in the hole formed through the plaster and lath. The metal bars, 1 and 2, are shown in a parallel position to each other and are thus held by the wing nut 4, which has been screwed up so as to exert a light tension between the two bars. After the device has been raised (Fig. 1), so that the lower ends of the bars 1 and 2 have cleared the lath sufficiently, it is then tipped over into a flat position upon the inner surface of the ceiling. The stud 3, which projects downward through the hole, is then grasped, and both bars, being still parallel to each other, are swung in a circle to ascertain the proximity to the nearest joist. If the hole is in, or near the middle between two joists, then the bars will swing clear and not touch either joist. Both bars, 1 and 2, are then brought approximately to an angle of 45 deg. to the lath. The lower or long bar 2 is then anchored, the pressure released by turning the nut and the uper or short bar, 1, is swung into the position outlined above. If, however, the hole is near to a joist, the attachment can then be manipulated to bring the short end of the upper bar 1 to the near joist, where the short end of this bar touches the near joist *e*. The short end of bar 1 is for the purpose of allowing a greater latitude in the spreading of both bars at right angles one to the other.

In Fig. 2 the arch upon the upper bar 1 is shown as it spans the lower bar 2, when both bars are spread, and permits the ends of the bars to rest evenly upon the inner surface of the ceiling. After the lower bar 2 is anchored, the two bars spread and the wing nut, 4, tightens; this arch automatically locks the upper bar 1 and prevents the stud 3 from turning while the stem of the fixture is being screwed to the stud 3. The attachment is designed especially for use in hollow ceilings where the substance or material used to cover the joists or beams is of such a nature as to allow the imbedding, or sinking into them of the anchor pins, 5, 6, 7 and 8 for the purpose of anchoring bar 2. It is especially designed for use as a permanent support for fixtures specified, but may be removed at any time by loosening the wing nut 4, then refolding the two bars as is necessary to place the same in position to support a fixture. The device may be also used on sidewalls in the same manner as applied to the ceiling. It can also be employed for closing up an outlet with a canopy when a fixture is not required. The fitting has been approved by the Underwriters' Laboratories, Inc.

Motor-Driven Humidifier

In such establishments as bakeries, feather factories, tobacco houses, etc., where a certain degree of moisture in the atmosphere is an absolute necessity for the proper preservation of certain materials the use of a moisture-producing device or humidifier is highly essential. In the accompanying illustration is shown such a device. It is electrically operated, automatically controlled and entirely self-contained. The humidifier may be mounted on the wall or columns of a room or suspended from the ceiling. The control apparatus is provided with a deflector which is in the regulator chamber, and when atmospheric conditions so require the deflector deflects the entering water into the overflow.



ELECTRICALLY OPERATED AND AUTOMATICALLY CONTROLLED HUMIDIFIER

The water enters from above and passes into the regulator chamber, whence it flows directly (when the automatic control permits) to the center of a rapidly revolving disk from which it is thrown by centrifugal force against the teeth of a copper grid at the circumference of the disk where it is pulverized. Back of the disk is a fan which forces outward all particles of moisture which are sufficiently fine to float around the edge of the case. The speed of the disk is such as to put a heavy pressure on a very thin film of water, and this film strikes the teeth of the grid with sufficient force, it is claimed, to break up the water completely into minute particles. The revolving disk is 16 in. in diameter and the horizontal drip pan 24 in.

Any number of "heads" may be installed. In one large textile plant, for instance, 422 heads are in successful operation, humidifying approximately 8,000,000 cu. ft. of air space. Humidifiers of the type shown are particularly in demand in cotton, woolen, silk and flax mills. They are also being utilized in considerable quantities not only in this country but also in Canada, Mexico and Cuba in tobacco-leaf and tobacco-manufacturing houses. They are especially useful in the sponge and dough rooms of bakeries, since they automatically maintain the proper humidity desired, thereby preventing the crusting of dough and causing the dough to rise uniformly and produce more loaves to each barrel of flour. By the use of cold water the temperature of a dough room may be reduced 10 deg. or more. Lately also the machines have been employed for humidifying and deodorizing theaters.

In mines they can be used to prevent explosions of dust. In furniture and automobile factories, the machines are utilized in fuming and varnish rooms and in printing establishments to prevent the curling of paper caused by dryness and also to prevent sticking caused by static electricity. The United States government is also employing them in the Agriculture Department in the cotton-grading rooms and in the Department of Plant Industry and Printing Department. Another use for the machines has been found in the manufacture of rolled gold.

The humidifier described above is being placed on the market by the Normalair Company, Winston-Salem, N. C.

Motor-Driven Intake Screens

Automatically-cleaned, traveling intake screens designed to remove leaves, wood, fish and particles of débris from water taken into power houses are now being manufactured by the Chain Belt Company of Milwaukee, Wis. Experimental installations of a few of these screens have been in operation in some of the large plants for three or four years. One of these installations shown herewith consists of a battery of screens arranged to travel on end sprockets spaced on 25.5-ft. centers. Each screen is a self-contained equipment provided with the necessary shafts, sprockets, bearings, steel chain belt copper-wire

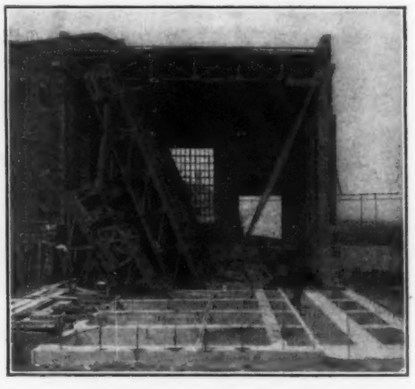


FIG. 1—BATTERY OF INTAKE SCREENS BEING INSTALLED

brackets and galvanized-steel frames. Both the head shaft and foot shaft are of cold rolled steel 3 in. in diameter. Each screen is driven by a 5-hp. motor operating through countershaft, worm gears and sprocket wheels mounted on

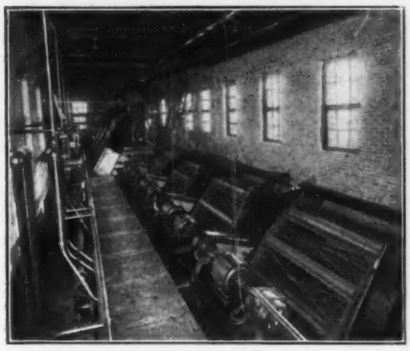


FIG. 2—BATTERY OF INTAKE SCREENS INSTALLED

the upper end of the screen. The screens themselves are made of No. 12 copper wire strung to produce 0.625-in. mesh. Each wire basket measures approximately 5.25 ft. by 1.5 ft. The baskets are stiffened and are held in place by galvanized-iron frames put together with sherardized bolts.

Electric Irons with Resistors Embedded in Alumina

The Dover Manufacturing Company of Canal Dover, Ohio, has recently brought out a line of improved electric irons comprising a 6-lb. household iron, a 7-lb. thermostatically-controlled iron,

FIGS. 1 AND 2—PHANTOM VIEW OF 6-LB. IRON AND IRON INVERTED FOR USE AS STOVE

and a 3.25-lb. "tourist" iron. A three-ply electrically-welded steel stand is supplied with each iron. The stand is arranged so that it may be used with the iron to make a small electric stove or to make a curling-iron heater.

The principal improvement in these irons, the manufacturer points out, lies in the heating elements. These employ nichrome resistance wire embedded in an indestructible insulator of fused alumina. The element is fixed into the ironing base under a pressure of 65 tons and is vitrified by application of heat to 1400 deg. C. The element after being thus treated possesses approximately the same coefficient of expansion as the iron and is not, therefore cracked by heating and cooling of the iron. This type of element is used in all three types of irons.

The phantom view of the 6-lb. iron shows how the cord is protected against wear by the flexible steel shield at the point of connection to the plug; how the plug provides for attachment of the cord to the iron; the dead air space between the core and the hood placed there to reduce the losses through heat radiated upward and to add to the comfort of the operator; and the large heat-

FIGS. 3 AND 4—PHANTOM VIEW OF 7-LB. IRON AND 6-LB IRON USED AS CURLING-IRON HEATER

absorbing core which lies above the heating element and acts as a heat reservoir. The 6-lb. iron in operation requires 550 watts.

The 7-lb. iron is identical in design with the 6-lb. iron except that it is provided with a thermostatic heat regulator that allows the operator to adjust it to produce any desired temperature from 300 deg. Fahr. to 600 deg. Fahr. The thermostat bar is made of a metal obtained in England and known there by the trade name "Duraluminum." Possibility of arcing is prevented by inserting a mica and aluminum foil condenser in the circuit. In the phantom view of this 7-lb. iron, the thermostat may be seen at the heel of the iron beneath the regulator button, and the condenser is shown in the middle of the iron above the heat reservoir.

The 3.25-lb. tourist iron is much like the 6-lb. iron, but is designed so that it can be speedily dismantled for packing. The cord is permanently attached to the iron. In operation it consumes 275 watts.

These irons received the gold medal

FIG. 5—3.25-LB. TOURIST IRON

award at the Panama-Pacific Exposition, and all have been approved by the Underwriters' Laboratories, Inc.

Ornamental Concrete Posts

The ornamental concrete posts illustrated are guaranteed by the manufacturers not to crack, freeze, craze or discolor. They are, distinctly, concrete posts, with sufficient strength to insure permanent and long life, it is claimed, and yet light enough in weight to make them commercially profitable to handle. They closely resemble granite shafts, being made up of a mixture of quartz crystals and other material, so that the surfaces glisten and sparkle in light with a very pleasing effect.

The posts, which from their form are known as "Star" posts, are made in water-tight steel molds, and are "wet mixed" and poured in one piece so that they are homogeneous throughout. The mold is also constantly shaken during pouring by an electrically-driven machine, to insure the elimination of all air pockets.

The steel reinforcing of the posts consists of a pipe through the center, and a round high-carbon steel rod in each flange of the post. These reinforcing rods are tied together at the top and bottom, and the bottom base plate is also reinforced by corrugated steel strips, interlaced.

The two types of caps for the posts,

FIG. 1—ORNAMENTAL CONCRETE POSTS IN KOSCIUSKO PARK, CHICAGO

one for the square-headed posts and the other for the headless posts, are shown in the accompanying illustrations. These fittings are made of an alloy of bronze and other metals, which is guaranteed not to rust or stain the

poles. The weight of the square-headed posts (known as the 13-ft. type D poles), ready for shipment, is about 900 lb., while that for the 10-ft. type D pole is 530 lb. The poles described

FIG. 2—INSTALLATION OF CONCRETE POSTS SHOWING BOTH THE SQUARE-HEADED AND HEADLESS DESIGNS

are manufactured by the Chicago Concrete Post Company, 608 South Dearborn Street, Chicago, Ill.

Double-Contact Push-Button

A push-button recently placed on the market by the Connecticut Telephone & Electric Company, Meriden, Conn., is fitted with long self-cleaning contact springs and double-positive wipe contacts which are protected from loose wires by a heavy metal guard. Lugs on the side of the binding-post screws

PUSH-BUTTON WITH DOUBLE WIPE CONTACTS

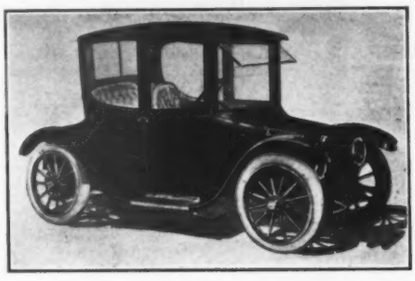
keep the wire connections in position, no soldering being necessary. The button is designed to fit a ⅝-in. hole and may be provided with either a black or pearl center as desired.

Economical Electric-Gasoline Car

The Woods Motor Vehicle Company, Chicago, Ill., has advised the Electric Vehicle Association of America through E. V. Gustafson, general sales manager, that early in May it will have ready for the market a "dual-power" automobile.

Anyone familiar with an electric vehicle knows that if the battery could be charged every few miles or every time it needed charging, or if it could be continuously charged, a battery only about half as large would be necessary. Supposing then that half the battery has been discarded, and in its place has been installed a small gasoline engine and dynamo to charge the remaining battery, the next obvious step would be to eliminate the dynamo and to use the vehicle motor driven by the engine as a dynamo. Put the engine and motor dynamo on the same driving shaft with only a magnetic clutch between them, arrange the controller so that the car may be driven by either the engine or the motor, and consider that the engine when doing the driving is also driving the dynamo and charging the battery, and a general conception of the Woods' principle may be formed.

The control mechanism of the car, it is pointed out, exactly resembles the control mechanism of a gasoline car. It consists in its visible parts of a sector with two finger levers mounted above the steering wheel. The outer lever is the electrical controller, and the inner one controls the gasoline engine. The outer lever works directly through a rod in the steering shaft, on a rheostat controller which governs all the necessary electrical connections. The inner lever has one electrical function: As soon as it is moved up from the neutral or dead position it actuates the magnetic clutch and con-



"DUAL-POWER" ELECTRIC PASSENGER CAR

nects the motor and engine. The motor turns over the engine and starts it just as the ordinary gasoline car is started. As soon as the engine is running at speed it turns the motor into a generator and charges the battery. At the same time the engine drives the car; however, when both levers are up, both the engine and motor drive the car, giving sufficient power and speed for any occasion, it is claimed. The motor is designed to drive the car alone, while the engine is still; but the engine cannot drive the car without also running the motor-dynamo and charging the battery. Coasting either down hill or on the level charges the battery.

Assuming the car to be standing still, the driver moves the outer or electrical finger lever, and the car starts as an ordinary electric vehicle, motor-driven from the batteries. It quickly attains a speed of 15 miles or 20 miles an hour. The driver may then continue to drive electrically or he may move the inner lever, and so start his engine. Both motor and engine will then be driving the car. If road conditions are severe, or there is hill climbing to do, the dual drive may be continued, otherwise the driver next moves the outer or electrical lever back to the neutral position. The engine will now be driving the car and running the motor as a generator charging the battery. If the driver wishes to stop, he presses on the single foot lever which operates the brake. If the motor is driving, the first movement of his foot lever shuts off the current. In any case, it short circuits the motor through a resistance making a magnetic brake. Further movement of the brake lever acts on a regular band brake on the rear wheels and stops the car.

The reversing operation, which is purely electrical, is accomplished with a short heel lever just back of the driver's foot. It simply reverses the electric motor without changing any shaft or gear connection.

It is reported that test cars which have been driven into the country for hundreds of miles around Chicago in all sorts of weather and with varying road conditions, have been making about 30 miles per gallon of gasoline while running on the engine alone and at the same time charging the battery for an additional 15 miles on the same gallon, thus making a possible mileage of 45 on 1 gal. of gasoline. The car can attain a speed of 40 miles per hour on the dual drive, it is asserted, or can maintain a speed of 20 miles per hour when run as a purely electric automobile. Another feature claimed to be a distinct advantage is the ability to set the speed at a certain rate, say 30 miles per hour, and immediately as the car "picks up" it will maintain this speed until the driver wishes it changed.

Twin Electric Washer

A new addition to its line of washing machines and designated as a

TWIN-TYPE BENCH WASHER

Model No. 8 outfit has been made by the Automatic Electric Washer Company, Newton, Iowa, and is illustrated herewith. The twin washer, as it is called, consists of two complete washing machines mounted as shown and equipped with one reversible swinging wringer. It is fitted with a side bench with capacity for rinse tub and clothes basket. The outfit is designed especially for use in small apartment houses and hotels where a large amount of continuous service is required. With the side bench folded the machine can be moved through any ordinary door. The entire apparatus weighs 300 lb. and is mounted on ball-bearing casters. It is equipped with a 12-in. wringer roll and is driven by a ventilated motor designed for continuous service.

NEWS OF THE INDUSTRY

A Review of Activities in the Electrical Manufacturing, Selling and Central-Station Fields

General Electric Announces Bonus System

All employees of the General Electric Company, it was announced this week, with the exception of directors and executive officers, who have been in the service of the company for five years or more will receive, in two installments, a bonus equal to 5 per cent of their annual wages. The amount thus distributed will aggregate, it is thought, approximately $1,000,000 per annum.

The first installment will be payable on or before Aug. 1 of this year, and will be a sum equivalent to 5 per cent of the individual earnings for the six months ended June 30, 1916. The second payment will be made on or before Feb. 1, 1917, when 5 per cent of the individual earnings for the six months ended Dec. 31, 1916, will be distributed.

It was stated by one of the officials of the company that this action was taken by the company to signify its appreciation of the services and efficiency of faithful employees who have been with the company for some years. These men by their years of service with the company have saved the company considerable money which would have been lost by training new employees, and have increased the company's efficiency by decreasing the otherwise large amount of shifting of employees and the consequent inefficiency of new men. The system is not to be compared, it was stated, with such plans as profit-sharing and stock-purchasing or partial-payment plan, or any other system for sharing in the profits or earnings of the company, as have been inaugurated by many other companies. No significance, it was said, attaches to it other than the company's desire to promote long, faithful and efficient service by its employees.

St. Louis Companies May Lay Wires Underground

Through two opinions recently given by City Counselor Daues to the board of public service of St. Louis both the Cupples Station Light, Heat & Power Company and the Laclede Gas Light Company may receive permission to lay underground wires in certain portions of the city and enter into active competition with the Union Electric Light & Power Company.

After the city counselor gave an affirmative opinion to the board on the Laclede Gas Light Company's application for a permit to lay underground conduits, it was stated that the company would soon get into active competition in the electric light field in northwest St. Louis with the Union company. The overhead wires of the Laclede company could not carry enough current, it was said, to permit the company to canvass for many customers, and therefore it was decided to ask permission to install an underground system.

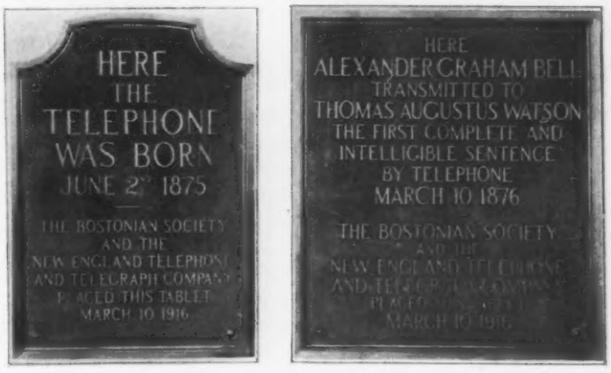
In another opinion Counselor Daues reversed an opinion of a former city counselor and held that the Cupples Station Light, Heat & Power Company may lay underground wires on Newstead Avenue, south of Olive Street, in accordance with a conditional permit given recently by the board of public service. It is based on the decision of the Circuit Court in the case of Froelich versus the Cupples company, which is now in the Supreme Court. The ruling follows:

"All companies having acquired rights under the Keyes ordinance may lay conduits or underground wire outside the underground district, and also in the underground district on such streets as have not been preempted, under such conditions as may be prescribed by the board of public service."

The Cupples company has obtained permits to erect more than 20 miles of overhead wires in the West End, and proposes to furnish electric energy at 5.5 cents per kilowatt-hour, with a discount, which, it is stated, will make the rate about 5 cents.

Birthplace of the Telephone Dedicated

Tablets marking the birthplace and first complete use of the telephone were unveiled on March 13 at Boston, Mass., by Dr. Alexander Graham Bell, thus commemorating the fortieth anniversary of the invention. The Bostonian Society and the New England Telephone & Telegraph Company provided two appropriately inscribed bronze plates, one of which is placed at 109 Court Street, now the Palace Theater, and the other at 5 Exeter Place. At the former site the experimental work leading to the creation of the telephone was carried on, and at the latter place the first complete and intelligible



BRONZE TABLETS MARKING BIRTHPLACE AND FIRST COMPLETE USE OF TELEPHONES

sentence was transmitted by the inventor to Thomas A. Watson on March 10, 1876, the conversation taking place between two adjacent rooms. In the evening Dr. Bell was the guest of the Boston City Club. In an informal address he recalled the incidents connected with the invention and development of the telephone. Vice-president E. K. Hall of the New England Telephone & Telegraph Company acted as toastmaster, and among those present were Dr. Clarence J. Blake of Boston, who assisted Dr. Bell in his early experiments; Lieut.-Gov. Calvin Coolidge of Massachusetts; Thomas D. Lockwood, general patent attorney of the American Telephone & Telegraph Company; Alfred Hemenway, Boston, who recalled the argument which led to the sustaining of the patent by the United States Supreme Court, and many other telephone officials, club members and guests. Dr. Bell said that, while he had dreamed of a network of wires covering the country, he had never

foreseen the linking together of the telephone and the radio, and that he anticipates being able to talk over the world without wires in the near future. Mrs. Bell accompanied the inventor at the unveiling of the tablets.

Legislation Enacted in Kentucky Affecting Public Utilities

Workmen's compensation was one of the important measures passed at the session of the Kentucky Legislature, which has just adjourned after its regular biennial session. It is practically compulsory, since it deprives employers of five or more persons of the usual common-law defenses, such as contributory negligence, negligence of a fellow servant, etc. It provides that insurance may be carried with commercial companies or mutual organizations, but does not create a State fund. Business and labor interests were both behind the bill.

Other legislation which affects the electric utilities of the State, directly or indirectly, may be listed as follows:

A bill providing that corporations must pay their employees at least twice each month. This measure has been signed by the Governor.

Another bill permitting competing telephone companies to merge.

A bill extending the rate regulation powers of the State Railroad Commission to cover telephone and telegraph companies.

A measure permitting electrical companies to make use of public highways for transmission lines, and another giving electrical companies the right of eminent domain.

A measure authorizing municipally-owned electric light and water plants to supply service to other towns.

T. N. Vail on Control and Regulation

President of American Telephone & Telegraph Company Discusses Some Dangers of Regulation and Suggests Commission Control of Labor

Theodore Newton Vail, president of the American Telephone & Telegraph Company, in his annual report for 1915, which was abstracted in the ELECTRICAL WORLD of March 8, after reviewing the work of the Bell system for the year, both technically and financially, dwelt at some length on certain dangers of regulation and control and advocated commission regulation of labor.

"Control and regulation," he said, "have done much to clear away the dangers of arbitrary action and unreasonable demands both on the side of the public and of 'public services.' The experience of the past, however, reveals dangers that menace its success.

"There is danger in the possibility of 'control and regulation' usurping the functions of management, and that the multitudinous questions of detail, trivial and negligible, for the most part simple questions of operation, will crowd out, and make it impossible to give full consideration to, other and more important questions. Deliberate consideration is impossible in an overworked body.

"Even the unsatisfactory practice of allotting questions to individual members for consideration, opinion and report, to be adopted as the opinion of the whole body, will not properly take care of the work. The inevitable tendency is that opinions and decisions are strongly influenced by, if not made by, minor officials and the clerical force.

"Many questions that come before these bodies are of such notoriety and are surrounded by so much sensational and mistaken assertion, misleading information and erroneous belief, that it is difficult for one not to be influenced in the formation of his opinion by a partial and often distorted presentation of the facts. In the settlement of such cases it is most important, therefore, that there should be abundant opportunity to get at the real facts, and ample time for deliberate consideration.

"Other menaces are: the division of jurisdiction—too many independent boards having jurisdiction over the same questions—and the reassumption of delegated jurisdiction by legislative bodies.

"These dangers not only menace 'control and regulation,' but they also menace the work of the 'public utilities.' These multitudinous questions and multipled bodies are the cause not only of great expense to the 'utilities,' which sooner or later the public pay, but they occupy the time of the operating officials, to the detriment of the real work of management. Many detailed reports are called for, and prepared at great expense, that cannot possibly be examined and digested, even if the whole force of the commissions gave all their time to them alone.

"Commissions of control and regulation act under delegated authority from legislative bodies, and were formed to protect the individual members of the public against corporate aggression or extortion and the 'corporate members' of the public against public extortion and aggression.

"The public is an interested party in the controversy, and just as susceptible of wrong notions or wrong impulses as any individual.

"These bodies have neither the power of the legislature nor the jurisdiction of the court, but are interposed between the two to give these questions of public relations the time and semi-judicial consideration which legislative bodies cannot give, and to lesson the number of cases in which appeal to the courts might be necessary. Their operation should be strictly confined to control and regulation and never invade the province of management. Management is inherent in the ownership, and is inseparable from the responsibility of ownership. The boundary line between management and regulation in many cases may be hard to define, but in a large majority of cases it can be determined with definiteness and precision.

"One of the most important of the functions of control and regulation is fixing the charge for service and prescribing the character of that service. The revenue of 'public utilities' depends upon these charges. That revenue must be sufficient for all costs of operation. Costs include wages, maintenance, depreciation, reconstruction, and capital charges. Wages are about, and for purposes of discussion can be considered to be, 50 per cent of the costs of operation.

CONTROL OF WAGES SUGGESTED

"When earnings are controlled, where surplus operating revenue after a reasonable return on capital goes back to the public, in reduction of charges, in construction of plant for which no capital securities are issued, in improvements in quality or quantity of service, wages also should be controlled.

"When bodies of control and regulation consider costs and sources of revenue, they consider wages not primarily as to their sufficiency or equity, but in an inclusive way with other expenses to assure themselves that costs are not excessive. If these bodies were authorized to intervene in disputes where wages and working conditions were concerned, they would consider them concretely, both as to sufficiency and equity and as a dominant factor in adjusting revenue.

"In the present state of public opinion, which has almost if not quite the force of common law, there is no reasonable dispute that should not be settled by common agreement, and when that fails the side which is disappointed and believes that it has a good case should be willing to leave its case to a body having power of control and regulation and possessed of a knowledge of and jurisdiction over all the essential elements necessary for reaching an equitable decision.

"Public service employees, nominally the employees of servers of the corporation, are the employees of servers of the public. The quality of the service rendered depends upon the interest of the employee in the service and the attitude toward the public. Employees who come in direct contact with the public can, in whole or in part, nullify or make objectionably inferior the efforts or service of the best organized and most comprehensive system or of the most efficient methods. No system can give good service unless there be a direct recognition on the part of the employee that he has a duty and obligation to the public served; and following that duty and obligation there must be some accountability of some kind to some one, if that obligation is evaded and the service is not rendered in the way it could and should be.

"Conversely, if employees are to be controlled they should also be protected. What, then, is the method of protection? In the past, boards of arbitration have been a resort when matters have come to an impassé. Special and independent arbitration bodies are temporary, do not possess and cannot appreciate all the factors, and, what is most important, have no responsibility for the effects of their decision on other interests.

"To adjust properly any question involving expenditure for any part, every factor in connection with the whole business should be considered—the revenue, costs or charges, and everything that effects these. This can only properly be done by one and the same body, which must have jurisdiction over all factors involved—and therefore the only logical body to regulate and protect public-service employees is that which regulates the 'public utility' itself and has the responsibility to the public for this regulation."

Public Service Commission News

District of Columbia Commission

On March 15, 1916, the Public Utilities Commission of the District of Columbia approved the report of its inspector of electric meters, giving the results of the voltage survey on commercial lighting and power circuits in the District of Columbia. This survey was made under the provisions of Sec. 15 of the commission's regulations for electric service in the District of Columbia, which section reads as follows:

"On all constant potential systems, electrical corporations shall maintain at the consumer's service cutout a standard voltage within the following percentages: 3 per cent from the standard during lighting hours and 10 per cent from the standard during other hours on systems primarily for lighting; 10 per cent from the standard on power circuits (trolley circuits excluded).

"Variations in voltage of momentary duration which do not occur successively and variations caused by the operation of apparatus on the consumer's premises in violation of the rules of the electrical corporation or due to other causes beyond the control of the corporation shall not be considered a violation of this section."

In the course of this survey, which covered the period from July 13, 1915, to Dec. 4, 1915, readings were taken at sixty-six stations in various parts of the district. These stations were selected with reference to substations, feeders and distribution points and were located in any accessible buildings nearest previously determined points. The stations selected were as follows: Market, 1; private houses, 2; churches, 3; hotels, 3; office buildings, 4; garages and stables, 8; apartment houses, 18; stores, 27.

Each observation covered a period of at least three consecutive days, and in some cases as much as four or five days, depending upon the variations shown by the charts.

The charts were divided into two periods for each day, the period between sunset and 11 p. m. being considered as "lighting" hours and the remainder of the day as "other" hours.

The results of this survey indicate that the voltage on a majority of the circuits in the District of Columbia is well maintained, and that the Potomac Electric Power Company is practically complying with Sec. 15, since but four stations were found to exceed the allowable limits.

The commission directed that the attention of the Potomac Electric Power Company be called to the locations at which the regulations were not being complied with.

Missouri Commission

The existence of a utility furnishing inadequate acetylene light at night and on cloudy days will not preclude the granting of a certificate of convenience and necessity to furnish electric light, heat and power continuously during the day and night it was held by the Missouri Public Service Commission.

Maryland Commission

In reply to a request for an opinion as to whether the commission has the power to fix wholesale rates for service where no such rates have been filed by the corporation, the general counsel for the commission stated that the question had never been judicially decided. However, since the law gives the commission authority to fix maximum rates for gas and electric utilities, he held that this includes the power to fix the maximum price for each of such reasonable classifications of these products by the wholesale as may be established by a gas and electric company. He advised the commission to insist that it had the power to fix maximum commutation rates whether any such rates have been filed by the public service corporation or not.

Pennsylvania Commission

In dismissing the application of the Midvalley Power Company for the approval of its incorporation, the Pennsylvania Public Service Commission held that there is no unsupplied demand for service that will justify admitting a competing utility into occupying territory where a consumer desiring service has made no request to the existing utility. Public necessity or convenience does not require the incorporation of an electric utility to serve a township where the existing utility has given fair and adequate service for a number of years, and is able and willing to supply all necessary equipment for furnishing any immediate or future demand for service at rates equal to those proposed by the applicant for incorporation, especially where a third company also has the right to serve the territory.

Iowa Commission

The Iowa Board of Railroad Commissioners held, in connection with the application by the Iowa Falls Electric Company for a franchise to construct and operate a transmission line from its plant in Iowa Falls to Wellsburg, that the granting of a franchise to an electric

NIGHT GRIPPER & SIDE GUIDE

utility to construct a transmission line along public highways and other private lands with the right of ingress and egress over the land, without making provision for compensation, does not contravene a constitutional prohibition against taking private property for public use without just compensation first being made, where the statutes have made adequate provision for compensation to the land owners.

Illinois Commission

In a case involving the Homer Electric Light & Power Company the Illinois Public Utilities Commission held that a meter rental charge of 25 cents per month on meters costing $6.77 unjustly discriminates in favor of consumers who own meters, since the difference between the meter rental charge and the actual charge for covering interest and depreciation and the value of the meter unfairly increases the unit cost of service to a consumer not owning a meter. This discrimination was eliminated by requiring the utility to acquire all meters and by permitting it to increase its rates if the loss of such charges should be an undue burden. The company was permitted in case of purchase to pay not less than the original price less 10 per cent for each year of installation and in case of rental to pay annually not to exceed 7 per cent of the cost of depreciation and 7 per cent interest, providing the consumer agrees to yield possession after the meter has been in service fifteen years from date of original installation, and that the amount paid to him shall not exceed $1.50 per annum.

Wisconsin Commission

In estimating the expenses of the electrical department of a municipal electric and water plant the Wisconsin Railroad Commission in the case of the village of Fennimore held that interest on construction bonds and salaries of an official giving his entire time to the utility and of officials performing both municipal and utility duties must be apportioned. An allowance of 4.5 per cent of the investment in the electric plant was held necessary to provide for accrued and accruing depreciation. Also, the commission held that taxes to an amount equal to what the utility will pay if it were operated by private persons should also be covered by the annual revenue. The city was allowed to increase the rates to an amount sufficient to meet operating expenses alone, since no demand had been made by the taxpayers that the plant yield a reasonable return on the entire investment. The revenue of a municipal plant for street lighting, it was held, should be provided for out of city taxes, the same as any other obligation. Where depreciation has been permitted to accrue, and where it is uncertain how much revenue a proposed increase in rates will produce, the plant, it was decided, should be permitted to charge a little more rather than a little less for service.

Although a private utility is required to make at its own expense the extension from a transmission line to the premises of a new consumer under the Wisconsin public utilities law requiring the utility to supply the equipment incidental to the supplying of such service, the municipality, it was held, should not be required to set more than two poles with the usual spacing. The commission held that the furnishing of electricity to large consumers at lower rates than to small consumers is not discriminatory, where the lower rate results from excess consumption at secondary rates lower than primary rates. Permitting the use of electric lights on a power line was held not to be an unjust discrimination, although the rates were different for the two classes of service, where only two small lights were used and the cost of separating the lighting from the power service would be greater than the increase in earnings from the separation of service. Where a municipal electric utility was operated under a limited earning power and finances, it was relieved from a statutory obligation to supplying meters to consumers. A municipal electrical utility may be permitted to charge a higher rate to consumers without the municipality than to residents where the rate to the former is not unreasonably high in comparison with the cost of service and other conditions affecting rates.

Maine Commission

The Maine Public Utilities Commission held, in connection with the electric lighting service for the town of Union, when a company that was granted the right to supply lighting service in a town did not do so, and for financial reasons could not do so, that an outside company should be permitted to serve the town.

The Public Utilities Commission of Maine has given its decision regarding better lighting service for the town of Philips by the Philips Electric Light & Power Company, but withheld its order until the company has an opportunity to canvass the matter and ascertain to what extent and how the requirements of the decision can be met. The commission says in its decision:

"Increased rates to private consumers should not be thought of. They must not be required to pay more for what they do use for the privilege of using what generally they will not wish to use. The natural result of an increase sufficient to afford a substantial return would be to reduce revenue by decreasing the number of patrons. If this method were to be invoked, it could be made to reach all alike only by increasing the minimum monthly rate, which is already as high as it should be. The additional service to the village corporation in keeping its streets lighted all night would, however, be a distinct benefit, and one for which an added charge might properly be made. But the corporation, while it must pay a just rate for the electricity it uses, cannot be compelled to use any. The company may publish a lawful rate for street lights, but their use is a matter of agreement, and the village corporation will need to be consulted before it is known how much can be derived from this source, and for how long a period.

"It necessarily follows that, if the additional service is to be had, whatever part of the cost is not left to be met by the company or borne by the village corporation must come from voluntary contribution. This is not a proper way to provide income for a public utility under ordinary circumstances, but here all parties concede its necessity, and it is only asked that the amount shall be determined.

"We find that if the company is to furnish all-night service dependent upon water power only, and without abatement of compensation for lack of current due to insufficient water power, it should receive in addition to receipts from present published rates the sum of $500 for one year from the date on which any order hereinafter made for that purpose shall become effective, said sum to be derived from increased rates for street lights and from private subscriptions.

"We find that if the company is to furnish all-night service with water power, employing auxiliary power to insure constant service, it should receive during a period of three years, in addition to receipts from present published rates, the sum of $1,000 the first year, $800 the second year and $700 the third year.

"Neither of these plans provides for twenty-three-hour service, and neither is, in our judgment, as satisfactory as may be worked out by the parties themselves if they will enter frankly and in good faith into negotiations, where greater elasticity is possible than in an arbitrary order. The commission earnestly recommends that they undertake to do so."

Working on a Portable Searchlight.—The Van Dorn Iron Works Company of Cleveland, Ohio, is experimenting with a new searchlight for war use. If plans materialize, the light will be small but will have the power of a large stationary light.

New Publication for Kansas City Company.—The Kansas City (Mo.) Light & Power Company will issue soon the first number of a monthly publication which will be sent to all customers and to employees. A name for it has not as yet been announced.

Governor's Nomination of New York Commissioners Confirmed.—The Senate of the State of New York on March 16 confirmed the nominations made by Governor Whitman of Travis H. Whitney and Charles S. Hervey to be members of the Public Service Commission for the First District. Mr. Whitney succeeds J. Sergeant Cram, whose term expired on Jan. 31, 1916. His term of office will expire on Jan. 31, 1921. Mr. Hervey was elected to serve for one year, succeeding George V. S. Williams, who resigned in January.

War Delays Cornell's Picture of Blondel.—For some years it has been the custom at Cornell University for each senior class in electrical engineering to present the electrical department with a picture of some man prominent in the electrical profession. The class of 1915 chose Andre E. Blondel, but was unable to secure a suitable picture in this country. Accordingly, an order was sent to France last spring. Due to the war and other delays, the picture did not arrive at Ithaca until the first week in March, 1916, and on March 15 it was formally presented.

Cannot Utilize Railway Poles for Carrying Light and Power Wires.—In an opinion given to the Board of Supervisors of San Francisco, the city attorney stated that the San Francisco & Sierra Power Company had no legal right to furnish electric power to customers by using the poles of the United Railroads of San Francisco for carrying its wires. He said that the franchise for the erection and maintenance of the poles was granted only for the operation of a street railway system and there is no authorization to utilize them for any other purposes.

Franchise Dispute in Lexington, Ky.—In determining the course the city will take in connection with the probable application of the Kentucky Utilities Company for a renewal of the franchise which expires this year, the City Commission will have the assistance of Morris L. Cooke, managing director of the Utilities Bureau of Philadelphia. Mr. Cooke spent a day in Lexington during the week looking into the situation. He took away with him a number of reports, etc., and will later give an opinion. The local utilities company applied two years ago for renewal of the franchise, but the terms proposed, and which the City Commission appeared disposed to approve, were rejected when an appeal to the referendum was taken under the lead of the Municipal League and the proposed contract was defeated.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Electrical Show for St. Louis.—The St. Louis Jovian League will join forces with the National Household Show and give a combination show April 3 to 15. The Jovian League has taken one-third of the space, which will be devoted to the display of electrical household conveniences and appliances.

30,000 Engineers Available for Preparedness Program. — The recently formed Water Power Development Association issued a report last week which said that there are 30,000 engineers in the United States out of work or making a bare living at odd jobs. The association urges that these men be employed by the industrial preparedness committee of the Naval Consulting Board in its plan to make a survey of the country's ability to produce war supplies.

Michigan Utilities Taxed at Quarter of a Billion.—The final assessment of the public-utility companies of Michigan for taxes on an ad valorem basis, as announced by the State Tax Commission, shows the properties to be valued at $253,041,200. On this property the State will collect in taxes $5,165,867.32, all of which, under the provisions of the Michigan constitution, goes into the primary school fund. The state board increased the assessed valuation of the properties $3,755,300 over last year, and the additional tax to be collected amounts to $585,453.66.

Plan Presented to Stabilize Mexican Boundary and Develop Water-Power.—A plan to stabilize the Texas-Mexico boundary, to develop water-power to the extent of 300,000 hp., and to provide irrigation for 2,000,000 acres of land, is proposed in a report issued by the Federal Bureau of Water Conservation containing the combined opinions of a number of engineers. The plan recommends the erection of several dams to hold the waters of Texas streams and urges a considerable amount of work along the Rio Grande to prevent the constant shifting of the international boundary.

Commission Law Prospective, Not Retroactive.—Holding that the language of the act creating the New Jersey commission is prospective and not retroactive, the Court of Errors and Appeals has rendered a decision which will restore to Plainfield its free lighting contract with the Public Service Electric Company. Plainfield had a contract with the company by which its council chamber and other buildings were to be lighted free of charge. This was carried out for fifteen years, when the company discontinued doing so because the public utility act made it unjust to give a preferential rate to any person, corporation or locality.

6000-Hp. Steel Mill for Chattanooga.—Contracts have been let for the equipment of the mill of the recently formed Chattanooga (Tenn.) Steel Company. About 6000 hp. of Westinghouse motors will be used, the energy to be furnished by the Chattanooga & Tennessee Power Company.

Governor Praises Utility Commission.—Speaking at a banquet before members of the Illinois Public Utilities Commission and employees, Governor Dunne declared that the presence of the commission had done away with the cry for municipal ownership. "Not only has the commission not been a source of expense to the State, but it has brought into the treasury the sum of $390,000 in fees during the last two years," he said.

Telephone Employees to the Number of 34,000 Purchase A. T. & T. Stock.—Of approximately 78,500 employees of the Bell Telephone System eligible, under the plan published on Jan. 1, 1915, to become stockholders of the American Telephone & Telegraph Company, 34,500, or almost half, purchased stock. The plan has been extended to include those employees who completed two years of service by March 1, 1916, those who could but did not participate under the original plan, and those who subscribed for a less number of shares than they are entitled to under the extension.

Electric Iron Ore Smelting in Norway and Sweden.—The two types of electric furnaces most used on the Scandinavian Peninsula for iron ore smelting are the Elektrometall and the Helfenstein types, according to the report of the Canadian department of mines which recently made an investigation of electric smelting of iron ores preliminary to establishing a similar industry in Canada. In June, 1915, there were in operation in Norway and Sweden seven Elektrometall furnaces of an aggregate rating of 25,400 hp., and there was in the process of construction ten furnaces of this type of an aggregate rating of 32,200 hp. Of the Helfenstein and Tinfos furnaces there were in operation in June, 1915, seven furnaces of an aggregate rating of about 14,000 hp.

Cleveland Electrical League Plans Beautiful Club Rooms.—If the plans of the Electrical League of Cleveland bear fruit, that organization will soon possess a beautiful suite of glass-incased club rooms on the roof of the Statler Hotel. The suite as it has been laid out will measure 180 ft. by 30 ft. over all and will contain a dining-room large enough to seat 300 people, a lounge, three private dining-rooms, a directors' room, committee room, a ladies' lounge and a ladies' dining-room. In these dining rooms a 50-cent luncheon and a 75-cent dinner will be served every day and à la carte service will be available at all times. Tipping will be forbidden. The rental and service charge on the suite will amount to about $5,000 a year. To secure funds the dues of members will be raised to $10 a year, and a campaign will be started to increase the membership from 500 to 1000.

NIGHT GRIPPER & SIDE GUIDE

Purdue Branch, A. I. E. E.—Dr. Edward P. Hyde recently spoke on the development of the science of illumination before a meeting of the Purdue Branch of the American Institute of Electrical Engineers.

Dallas (Tex.) Electric Club and Jovian League.—Nathan Adams, vice-president of the American Exchange National Bank, addressed the Dallas Electric Club and Jovian League at the weekly luncheon on March 17.

Chicago Electric Club-Jovian League.—James E. Latta, special agent of the Underwriters' Laboratories, spoke at the meeting of the Electric Club-Jovian League of Chicago on March 16, his subject being "Fire and the Fight Against It."

Los Angeles Jovian League.—At the meeting of the Los Angeles Jovian League on March 8 Charles E. Jarvis, Los Angeles representative of the *Christian Science Monitor*, spoke on "Journalism — Its Opportunity and Achievement."

Pittsfield Section, A. I. E. E.—The seventh annual banquet of the Pittsfield Section of the American Institute of Electrical Engineers was held at the Wendell Hotel on March 3. Prof. M. I. Pupin, inventor of the loading coil, was the guest of honor.

Allentown Branch, N. E. L. A.—On March 7 F. B. Mitchell of Landers, Frary & Clark, addressed the members of the Allentown branch of the National Electric Light Association on the subject of household appliances, particularly the flatiron, percolator, grill and toaster.

New York Jovian League.—The first meeting following the reorganization of the Jovian League of New York City was held at the Hotel Imperial on March 22. Hon. Henry Lane Wilson, former Ambassador to Mexico, delivered a comprehensive address on "The Mexican Situation."

Lynn Section, A. I. E. E.—Richard H. Rice, engineer of the turbine department of the Lynn Works of the General Electric Company, delivered a lecture on "Lines of Progress in Turbine Engineering" before the Lynn (Mass.) Section of the American Institute of Electrical Engineers at a recent meeting.

Schenectady Section, A. I. E. E.—The 171st meeting of the Schenectady Section of the American Institute of Electrical Engineers was held on March 7. B. G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company, read a paper entitled "Iron Losses in Direct-Current Machines."

Los Angeles Section, A. I. E. E.—At the regular meeting of the Los Angeles section of the American Institute of Electrical Engineers on March 21 the subject of "The Relation of Electrical Engineering to the Problems of the Mount Wilson Solar Observatory" was discussed by Dr. Arthur F. King, physicist of the observatory.

Rejuvenation of Kansas City Jovians.—A. P. Denton, first tribune, and J. D. Todd, second tribune, of the Jovians of Kansas City, have announced that the third rejuvenation of their administration will take place on June 6 aboard the Steamer Chester on the Missouri River. The work will be put on in the large dining room of the boat.

Associations and Societies

A complete Directory of Electrical Associations is regularly printed in the first issue of each month on the next-to-last text page.

Louisville Radio Club.—W. W. Smith is president of the recently formed Louisville Radio Club, which is devoting most of its attention to wireless telegraphy and study of general electrical matters. Meetings are held at regular intervals at the offices of the Tafel Electric Company, at which well-known authorities in their lines are present as speakers.

Newark Jovian League.—At the regular weekly luncheon of the Newark Jovian League on March 3 S. B. Burroughs, general lighting representative for the State of New Jersey of the Public Service Electric Company, spoke on "Faith as a Commercial Asset." Following Mr. Burroughs, a number of those present testified to the commercial value of faith.

Kansas Electrical Contractors to Meet at Wichita.—The Jovian League of Wichita, Kan., will entertain the Electrical Contractors' Association of Kansas, at the State convention at Wichita, on May 19. There will be luncheon with the Electric Club, a motor-car ride over the city, and a rejuvenation in the evening. J. L. Harvey, first tribune, will have charge of the ceremonies.

Chicago Section, I. E. S.—"The Latest Development in Incandescent Lamps" was the topic for discussion at the March 16 meeting of the Chicago Section of the Illuminating Engineering Society. The speaker was A. S. Merrill, assistant chief engineer of the National Lamp Works, and the discussion was led by Preston S. Millar, general manager of the Electrical Testing Laboratories, New York City.

Philadelphia Section, I. E. S.—A joint meeting was held on March 17 by the Philadelphia Section of the Illuminating Engineering Society and the Philadelphia Section of the American Institute of Electrical Engineers. Charles F. Scott presented a paper on "Engineering Training as a Business Asset." At the next meeting of the section, on April 21, T. J. Place will present a paper on "Type C Lamps in Street Lighting."

Detroit-Ann Arbor Section, A. I. E. E.—E. L. Crosby of the Detroit Edison Company, in speaking before the Detroit-Ann Arbor Section of the American Institute of Electrical Engineers on March 10, said America will soon effect an adaptation of the electrical furnace to American needs that will place the United States ahead of Germany in the use of this modern appliance. His subject was "The Development of the Electric Furnace."

Convention of Missouri Association of Public Utilities.—The Missouri Association of Public Utilities, which represents practically all of the privately owned public utilities in the State, will hold its tenth annual convention on May 11-13 on board the steamer Quincy, en route from St. Louis to Peoria, Ill., and return, traversing the Mississippi and Illinois Rivers. F. D. Beardslee, 315 North Twelfth Street, St. Louis, is secretary and treasurer.

St. Louis Jovian League.—William McChesney Martin, chairman of the Federal Reserve Bank Committee, was the speaker of the day at the weekly meeting and luncheon of the Jovian League of St. Louis on March 8. Mr. Martin urged the Jovians to institute a trade acceptance system instead of an open account. He declared that such a system would prevent business men from overselling to their customers and customers from the evil of overbuying.

New York Section, A. S. M. E.—The entertainment committee of the New York Section of the American Society of Mechanical Engineers has arranged a dinner to be given to the members and their ladies at the Machinery Club on March 29. The purpose of the dinner is to have it a purely social occasion when the members of the section may become better acquainted with a view to making membership in the section a social bond as well as a professional one.

Joint Meeting Portland Sections, A. I. E. E. and N. E. L. A.—A joint meeting of the Portland (Ore.) sections of the National Electric Light Association and the American Institute of Electrical Engineers was held in that city on March 7, at which time two reels of Electric Vehicle Association "movies" were shown. This was followed by a discussion of the local field for electric trucks and the success which had followed their adoption by a department store of Portland.

Minnesota Electrical Association — The ninth annual convention of the Minnesota Electrical Association was held at the Hotel Radisson, Minneapolis, on Tuesday and Wednesday of this week. The program was as follows: Tuesday afternoon — Address of welcome, by Mayor Wallace G. Nye; "Possibilities and Practicability of the Electric Range," by J. D. A. Cross; "Attitude of the Central Station Toward the Consumer," by O. A. Rofelty; "Rates for Electric Service," by W. C. Beckjord. Tuesday evening—Jovian rejuvenation at the Elks' Club. Wednesday morning—"Boiler-Plant Efficiency," by H. S. Whiton and J. L. Lawrence; report of committee on rural extension, E. J. LeBlond chairman. Wednesday afternoon, 2 p. m.—"Some Central-Station and Electric Transmission Statistics," by Prof. W. T. Ryan, University of Minnesota; reports of committees and election of officers. Wednesday evening—Annual banquet under auspices of the association.

FINANCE, COMMERCE AND INDUSTRY

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies—Notes on Industrial Activities and Business Methods

Manufacturing and Industrial

High-Tension Insulators in Demand

While this season of the year is ordinarily the off period for the sale of high-tension insulators owing to the weather handicap to outdoor construction work, manufacturers state that the business this year is excellent. At the outbreak of the European war, over a year and a half ago, central stations and transmission companies were forced for financial reasons, to generally curtail and to cut line extension expenditures to a minimum. For this reason very few insulators were installed until quite recently, other than those needed for emergency repairs and to replace those damaged from various causes.

With the better financial and business conditions, however, there has been an increasing amount of purchasing. But few of these orders, it is stated, are for new-line equipment. They are for extensions of existing lines to meet the increasing demands of territories now served, to serve outlying territories where a sufficient load has been developed and to serve large individual consumers. Practically all of these extensions are necessary owing to the load and are in but few cases due to promotion work. Many of the extensions were contemplated early in 1914 but put off when the war broke out. Now, in spite of the greatly advanced prices, these lines must be built and new insulators must be purchased.

Notwithstanding the unfavorable nature of the underlying conditions, high-tension insulator manufacturers find business good, and expect it to become better. It was pointed out that present construction was necessary and that soon, very soon in fact, construction of a different nature would begin. In different sections of the country large operating companies have for some time been acquiring near-by properties which it is almost certain will be tied into single systems by means of networks of transmission lines. Other new building is expected and in general, it is thought that construction work will shortly embrace a considerable amount designed primarily for future growth.

To what extent present orders are for the purpose of restocking it is not possible to say. Opinions differ widely. Some manufacturers lay considerable importance to this buying channel, while others place little or no weight on it, depreciating the idea that insulators are ever purchased in large quantities for purposes of stock.

Prices, as with most of the other types of electrical apparatus and fittings, have in most cases advanced, the latest advance having occurred but a couple of weeks ago. It is not expected, however, that prices will make another advance, or at any rate not in the near future.

The prices of raw materials, labor and the volume of buying are given as the reasons for the advance in price. Metal fittings have gone up considerably and labor costs more to-day than it did a year and a half ago.

Deliveries are for longer periods now than under normal conditions. It is very difficult to obtain metal parts, and the long deliveries of this material has held back the insulator manufacturer. Also, the freight embargoes have caused further delays in delivery.

No change, as far as it could be learned, has occurred in either the credit or collection situation. Customers, it is pointed out, besides being mostly of a prominent and financially responsible class, are old customers and their credit standing is well known.

The New England Engineering Company, Waterbury, Conn., has appointed Starbuck Sprague, formerly with the General Electric Company, as sales manager.

The Chelsea Fiber Mills have removed their sales offices from 33 Union Square West to 212 Fifth Avenue, New York.

The Anderson Electric Car Company, Detroit, Mich., has reduced the prices of its renewal batteries from 25 to 27 per cent, making a considerable reduction in the maintenance cost of its electrically operated cars.

Robert H. Anthony, New England representative for the R. Thomas & Sons Company, the Dicke Tool Company and Hickey & Schneider has removed his office to the Cummings Building, 261 Franklin Street, Boston, Mass.

The Reeves-Owen Electric Company, Montgomery, Ala., has appointed Harry Hunter, formerly with the Buckeye Electric Division of the National Lamp Works of the General Electric Company, Cleveland, Ohio, as a member of its sales force.

The Ames Iron Works, Oswego, N. Y., have appointed Walter Castanedo, for many years New Orleans representative of the Harrisburg Foundry & Machine Works, as their district manager at New Orleans with headquarters at 1103 Hennen Building in that city.

Automatic Electric Washer Company.—H. L. Ogg until recently has not been actively associated with the Automatic Electric Washer Company, Newton, Iowa, although he was actively connected with the company prior to 1912. He is now acting as president and advertising manager of the company. O. B. Woodrow, formerly secretary-treasurer of the concern, has severed his connection with it.

Stanley H. Rose, special agent of the Department of Commerce, has arrived in New York City to take charge of the local office of the Bureau of Foreign and Domestic Commerce, succeeding E. C. Porter, who recently resigned to accept the position of executive secretary of the newly organized American-Russian Chamber of Commerce. Mr. Rose has recently acted in the capacity of a traveling secretary, carrying out the function of a local bureau where such did not exist.

Barstow & Company Adopt Emblem.—W. S. Barstow & Company, Inc., engineers and managers, of 50 Pine Street, New York City, have officially accepted and adopted as their emblem a golden link on a black background, all inclosed in a circle of gold. The company attaches to the emblem the meaning "Strength—Security—Energy," the link signifying the first two qualities and the circle, which is the Egyptian hieroglyph for the sun, the source of all terrestrial energy, signifying the latter.

Pacific Coast Manufacturer Busy.—The Metropolitan Electric Company, Seattle, Wash., manufacturer of switches, switchboards, panelboards, steel cabinets, etc., reports that business in its line is especially brisk at present and that indications point to a big year for 1916. Several interesting contracts have been signed during the past two months, among which is the complete electrical equipment for the new Times Publishing Company building of Seattle. The Metropolitan Electric Company was organized in April, 1915. C. L. Moses is president and A. M. Asselstine is secretary.

B. R. T. Orders 30,000-Kw. Turbine for Williamsburg Station.—The Brooklyn Rapid Transit Company has ordered from the Westinghouse Electric & Manufacturing Company a 30,000-kw. single-unit turbo-generator set for installation in the railroad company's Williamsburg generating station. The turbine will operate on steam at 200 lb. pressure and 115 deg. superheat and will exhaust into a 28.5-in. vacuum furnished by a 40,000-sq. ft. Westinghouse surface-type condenser. The new machine, which will operate at 1500 r.p.m., will furnish twenty-five-cycle, three-phase current at 6600 volts and 11,400 volts, star and delta, respectively.

National Carbon Experiences Large Increases in Lighting Carbon, Electrodes and Storage-Battery Business.—Owing to the war conditions in Europe, but not to war orders, the National Carbon Company of Cleveland, Ohio, has for some time been experiencing a largely increased business, particularly for lighting carbons and carbon electrodes for shipment to England, Norway, Sweden, Russia and other foreign countries. At the same time the domestic business in these goods has largely increased on account of the greatly decreased importation of foreign-made goods. The demand for the company's storage batteries has increased to such an extent that it has been necessary to erect a new plant. This plant, which is situated at Cleveland, will be completed in a few months, and the facilities will be such, the company expects, as to enable it to take care of practically any demand that may be made upon it for storage batteries.

Westinghouse Electric Signs.—One of the most effective electric signs recently erected in the vicinity of Pittsburgh is that on the Shadyside works of the Westinghouse Electric & Manufacturing Company, which are devoted chiefly to the manufacture of starting, lighting and ignition equipment for gasoline automobiles. The sign is visible both day and night and can be easily seen by passengers on the Pennsylvania Railroad near-by. The letters are of the metal-channel type, the company's name being in 3-ft. letters while the lower words are 2 ft. high. The sign is lighted by 566 5-watt, 55-volt tungsten lamps, giving a connected load of 2.8 kw. The sign was designed by the maintenance department of the Westinghouse company and built and erected by the Federal Sign System (Electric) of Chicago. Energy for lighting it is furnished by the Duquesne Light Company of Pittsburgh.

To Investigate South American Market for Electrical Goods.—Philip S. Smith of New York will leave within a few weeks for an extended tour of South America to make an exhaustive investigation of the market for electrical goods. This investigation is being instituted by the Bureau of Foreign and Domestic Commerce for the purpose of aiding American Manufacturers. In this connection the bureau says: "In the last few years there has been evidenced a growing interest among manufacturers of electrical goods in the United States in the possibilities of South American markets, and the reports of Mr. Smith will furnish the technical information necessary to enable our producers of electric equipment of all kinds to cultivate the field intelligently. The high price of coal in most parts of South America and the prevalence of water power have caused a considerable development in the hydroelectric industry, and American appliances should find an increasing sale. Mr. Smith will report both on the present conditions in the trade and on the future prospects."

New Wagner Buildings.—The Wagner Electric Manufacturing Company has started construction on two new buildings to augment its present factory group on Plymouth Avenue, St. Louis. Building No. 1 is 140 ft. by 90 ft., with an open bay spanned by a traveling crane 50 ft. long, with galleries 20 ft. in width on either side of this bay. This building will be devoted to punch press operations. The framework will be of structural steel, with an all-metal roof having a longitudinal skylight down the center. Building No. 2 will be 108 ft. by 90 ft. and devoted to various operations involving the production of small parts, including small punch-press work. This building is of reinforced concrete construction and fireproof throughout. The new structures will be connected by a tunnel with the main section of Plant No. 1. Contracts call for the completion of the No. 1 building by April 21 and of the No. 2 building by June 2. The designing of these buildings was done by the Condron Company of Chicago, and the reinforced concrete floors of Building No. 2 are to be built under the patented "Acme" system of the Condron Company. Virtually the entire exterior wall area of both buildings is glass, insuring unexcelled daylight working conditions on every floor.

Louisville Increases Generating Capacity.—Provisions have been made for increasing the generating capacity of the Waterside station of the Louisville Gas & Electric Company. The improvements, which will be under the supervision of the engineering department of H. M. Byllesby & Company, will include an addition to the present building, the installation of a new 15,000-kw. General Electric steam-turbine generating unit with Worthington condensing equipment, including 600 ft. of intake and discharge tunnel, four new Babcock & Wilcox boilers equipped with underfeed forced-draft stokers, switchboard apparatus and a 250-ft. stack having a diameter of 13 ft. 6 in. The building will be fireproof throughout, and the efficiency of the new equipment will be such as to effect an appreciable saving in operating cost. This enlargement of the station comes within a year of the last enlargement of generating capacity, a 6500-kw. unit with all the necessary auxiliary equipment and boiler rating having been installed in the summer of 1915. Construction work on the addition has already been started, and it is expected that the new equipment will be in service in time for the coming winter's load. Approximately $1,000,000 will be required for these improvements, the funds for which have been provided by the sale of $500,000 of the company's 6 per cent bonds and $750,000 of 6 per cent three-and-one-half-year notes. When the present plans have been carried out, the Louisville Gas & Electric Company will have an electric generating rating of 35,000 kw.

Electric-Truck Sales Increasing Rapidly.—The General Vehicle Company, Long Island City, N. Y., reports that beginning with the first of the year the sales of "G. V." electric trucks have been more satisfactory than at any time in the past two years. This company has always had a large reorder business, but this year sales to present users have reached unexpected proportions and the number of new customers added is also without precedent. Among the reorders received are twenty more 3½-ton American Express trucks for Boston, twenty-five more 2-ton American Express for New York, giving them more than 150; seven more for Anheuser-Busch Brewing Association at Chicago, making forty-four for them in four cities; ten more 5-ton trucks for Jacob Ruppert, giving this brewer approximately 160 "G. V." trucks; twenty more 2-ton trucks for Adams Express Company, which swells their total to more than 200 "G. V." electrics; ten more freight trucks for the Mallory Steamship Company, and smaller reorders from Milwaukee Railway & Light Company, Capitol Milling Company, Los Angeles; H. J. Heinz Company, J. & J. Slater (shoes), Cady Lumber Company, St. Paul & Tacoma Lumber Company (lumber tractors), National Lead Company, Empire State Dairy Company, Burton-Furber Coal Company and many others. Hutzler Brothers of Baltimore bought four more worm-drive delivery wagons and Bullock's Store in Los Angeles others of this type. The Lincoln Safe Deposit Company has added another 3½-ton van, which sale is interesting inasmuch as they have purchased one of these vans each year for seven years without a break. Among the new truck customers are the following: Bank of the Metropolis, New York; Aetna Brewing Company of Hartford, the first brewery truck to go under the local battery service system; J. L. Mott Iron Works, Chase & Sanborn, Boston, a worm-drive special delivery tea and coffee wagon; the Carborundum Company, Niagara Falls; Nobscot Spring Water Company, Boston; Arlington Company of Arlington, N. J.; C. J. Lincoln Company, Hartford; Emery-Beers Company; H. Kohn, Inc.; Dayton Engineering Laboratories, and many others.

Part Wages May Play in World Trade After War.—In its March letter the National City Bank of New York gives a few paragraphs to increased wages, pointing out that the laborer makes no gain but that after the war this large labor cost may keep American products out of the world's markets. The paragraphs on wages are as follows: "Generally speaking, wages enter into prices of the product, and unless counterbalancing economies are introduced, a rise of wages means that the public must pay more for the goods or services, and as the public is largely composed of wage-earners, the effect is to raise the cost of living on themselves. There is no real advancement or betterment of conditions in this. This is not to say that a close organization of wage-earners which is able, either by reason of the skill or knowledge required or by help of trade-union rules, to have a practical monopoly of a certain employment may not lift wages above the level for work of the same grade in other employments, but this is at the expense of other working people who must help pay these costs. The coal

miners who are now complaining of the cost of living and asking to have their wages raised will be affected adversely by higher freight charges upon coal or upon the goods they consume, and the railway men and all other classes of wage-earners will be unfavorably affected by higher costs for mining coal. Furthermore, when the advances have been made all around the circle, so that each class of workmen has gained enough to offset its own increased payments to the others—or, in other words, when each has obtained enough to make good the rising 'costs of living'—the net result is likely to be that the United States will be too far above the level of costs abroad to sell its products in foreign markets. It is certain that under normal conditions abroad this situation would result in a curtailment of production here and a state of slack trade and non-employment which would be costly to wage-earners. The truth is that the only gains made which are not at the expense of other groups or classes are those which come from improvements in the methods of production and distribution. Wherever the product can be increased or a saving can be accomplished in distribution, there is a chance for gain, either to producer or consumer or both."

NEW YORK METAL MARKET PRICES

	March 14 Selling Prices Bid	March 14 Selling Prices Asked	March 21 Selling Prices Bid	March 21 Selling Prices Asked
Copper				
London, standard spot	£ 105 0 0		£ 112 5 0	
Prime Lake	27.50 to 27.75†		27.37½ to 27.62½†	
Electrolytic	27.50 to 27.75†		27.37½ to 27.62½†	
Casting	25.50 to 26.00†		25.75 to 26.25†	
Copper wire base	29.00 to 29.50†		29.00 to 29.50†	
Lead	7.00		7.00	
Nickel	45.00 to 50.00		45.00 to 50.00	
Sheet zinc, f.o.b. smelter	25.00†		25.00†	
Spelter	16.80 to 17.05†		17.67½ to 17.92½†	
Tin, straits	55.00†		50.00†	
Aluminum, 98 to 99 per cent.	57.00 to 59.00†		57.00 to 59.00†	

OLD METALS

Heavy copper and wire	21.00 to 21.50†		21.00 to 21.50†	
Bras, heavy	13.50 to 14.00†		13.50 to 14.00†	
Brass, light	11.50 to 12.00†		11.00 to 11.50†	
Lead, heavy	5.75 to 5.85†		6.25 to 6.50†	
Zinc, new scrap	14.00 to 15.00†		15.50 to 16.00†	

COPPER EXPORTS

Total tons to March 21	12,567

†Nominal.

Corporate and Financial

American Gas Company, Camden, N. J.—The earnings for the company for the year ended Dec. 31, 1915, follow:

Gross earnings, affiliated companies		$3,979,614
Operating expenses, affiliated companies		2,024,194
Balance		$1,955,420
Miscellaneous income, affiliated companies		80,463
Total		$2,035,883
Fixed charges, affiliated companies		1,060,392
Balance		$975,491
Depreciation charges, affiliated companies		193,316
Balance		$782,175
Sundry income items, American Gas Company		322,096
Total revenue, American Gas Company		$1,104,271
Expenses:		
Interest on 5 per cent bonds, American Gas Company	$123,734	
Interest on 6 per cent three-year secured gold notes	60,485	
Interest on loans	7,065	
General expenses of American Gas Company	151,063	
		342,347
Surplus		$761,924
Dividends, American Gas Company		459,220
Net surplus		$302,704
Distributed as follows:		
Credited to contingent reserve		$125,000
Transferred to general surplus		177,704
Total		$302,704

American Power & Light Company, New York, N. Y.—The subscription by stockholders to the new issue of $6,984,300 6 per cent gold debenture bonds closed on March 15. The total subscriptions received amounted to more than 85 per cent, leaving less than 15 per cent to be taken by the underwriters.

Canton (Ohio) Electric Company.—On March 15 the stockholders of the Canton Electric Company authorized an increase of capital stock from $2,500,000 to $12,500,000 and a change in name to the Central Power Company. Plans have been made to acquire a number of plants in central Ohio.

Narragansett Electric Lighting Company, Providence, R. I.—The annual report of the company for the year ended Dec. 31, 1915, states that the revival of business conditions has been felt by the company both in increased use of electricity by existing customers and in the acquisition of a large amount of new business. The sales of motors and supplies have increased very rapidly, and the sale of tungsten lamps has increased over previous years 45 per cent. Sales of motors, cooking apparatus, portable lamps and other articles which consume electricity have been greater than for any previous year, and the profit on these sales has materially reduced the selling expense. The condensed income account for the year follows:

Gross earnings		$1,771,601
Operating expenses	$937,770	
Reservation for renewals and contingencies	199,692	
Interest on debentures	40,000	
Miscellaneous debits—net	12,661	1,190,123
Net income		$581,478
Disposition of income:		
Dividends	$486,667	
Credited to surplus	94,811	$581,478

Northwestern Electric Service Company, Erie, Pa.—Through purchase of the common stock, the Northwestern Electric Service Company, recently organized, will control the Northwestern Pennsylvania Railway. The electric service company has leased for ninety-nine years the property of the People's Incandescent Light Company, Meadville, Pa., and will extend its light and power service to other points in its territory. A new high-tension transmission line will be constructed, extending from Erie through Fairview, Girard, Albion, Springboro, Conneautville to Harmonsburg. The present high-tension line of railway extending from Erie to Cambridge Springs will be extended through Venango and Saegertown to Meadville and Harmonsburg, thereby completing a loop service of approximately 95 miles, delivering power to all points in the territory for railway, light and power use. Power will be purchased from the Erie County Electric Company, at Erie, with a reserve plant at Meadville, Pa.

Northern Ohio Traction & Light Company, Akron, Ohio.—Demands upon the power plants of the company during the past year for all purposes enforced a large increase in output, it was pointed out in the annual report for 1915. The steady growth in requirements for railway purposes was greatly exceeded by the demands of the commercial power and light department. The hydroelectric plant was affected by the diversion of part of upper Cuyahoga River into the new reservoirs of the Akron city water-works system, and the output of the plant therefore fell below the production of the preceding year. The power productions at all stations were:

	Kw.-hr.
Gorge steam-power plant	65,739,425
Canton steam-power plant	15,566,527
Hydroelectric plant	7,049,300
Total	88,355,252

This compares with an output of 74,739,133 kw.-hr. the preceding year, an increase of 13,616,119 kw.-hr., or 18.2 per cent. To provide for future requirements contracts have been closed for the installation of two 20,000-kw. turbo-generators at the Gorge power station, more than doubling its rating, and for additional rotaries in several substations as needed. The results of operation of the system as compared with the years 1913 and 1914 are as follows:

	1914	1915
Gross earnings for the year	$3,636,085	$3,890,751
Operating and taxes	2,237,429	2,373,010
Net earnings	$1,398,656	$1,517,741
Applied to payment of interest on funded debt and notes payable	606,898	628,309
Available for company's uses	$791,758	$889,432
Dividends on preferred stock	182,364	199,281
Dividends on common stock	450,000	450,000
Surplus	$159,394	$240,151

Public Service Company of Northern Illinois, Chicago, Ill.—The number of stockholders of the company has shown a steady increase according to the annual report for 1915. At the close of the year there were 1681 recorded stockholders, of whom 1157 reside in the city of Chicago, 307 reside elsewhere in the State of Illinois and 217 live outside the State. There are fifty-seven employees who are stockholders of the company. In the year 1913 an employees' savings fund was started for the purpose of aiding employees to purchase the company's stock through subscriptions extending over a period of five years, and it is estimated that there will be 1000 additional employees in the list of stockholders at the end of that period. The number of electricity customers increased during the year by 9690, making a total of 64,540. The earnings and expenses for the year were as shown in the following table:

Gross earnings		$6,903,228
Operating revenue from electricity, gas, heating and water	$6,244,477	
Merchandise sales and other income	658,751	
Expenses (including taxes)		3,749,370
Operating expenses for electricity, gas, heating and water	$3,200,918	
Merchandise department	548,452	
Earnings		$3,153,858
Charges against earnings:		
Interest on bonds and notes		1,492,280
Available for dividends		$1,661,578
Dividends paid:		
Preferred stock		455,280
		$1,206,298
Common stock*		528,281
Surplus for the year		$678,017
Appropriated out of surplus earnings for the year for amortization and depreciation reserve		450,000
Balance carried to surplus		$228,017

*Including $49,850 on stock held by trustees of employees' savings fund and not yet paid for, which amount has been returned to the company's treasury.

York (Pa.) Railways Company.—The annual report of the company for the year ended Nov. 30, 1915, states that, as a natural consequence of the disturbance of trade and industrial conditions during the latter part of 1914 and extending well into 1915, the growth of railway receipts was checked. The greatly increased use of private motor cars contributed to this result. A return of industrial activity during the latter part of the year brought about a gradual recovery, and the company now finds business conditions on a decidedly better basis than at the end of last year and receipts approaching normal. On the first of last July the company received permission from the Public Service Commission for the merger of five suburban lighting companies. One of these companies was the Merchants' Electric Light, Heat & Power Company, to the addition of whose business the increase in receipts from light and power was largely due, although it is stated that the growth in this department has been wholesome throughout the year. The physical combination of the properties in the merger means, it was stated, a rearrangement of the overhead lines and a simplification of poles and wires on the highways. This work is now well under way. The merger will effect economies in the operation of the plant and in general expenses, and at the same time more satisfactory service can be rendered to the public. The earnings for the year ended Nov. 30, 1915, compared with the previous year, are as follows:

	1915	1914
Gross earnings	$828,300	$796,645
Operating expenses	$411,346	$408,141
Allowances for depreciation	20,658	16,916
Taxes	46,110	39,755
Total	$478,114	$464,812
Net earnings	$350,186	$331,833
Interest and bond discount	239,474	223,339
Net income	$110,712	$108,494
Surplus account:		
Balance Dec. 1, 1915		$105,300
Deferred payment applicable to year 1914		520
Net income for the year, as above		110,712
Total		$216,532
Dividends paid		80,000
Balance		$136,532

New Utility and Industrial Companies

The Denmark Light & Power Company of Denmark, Wis., has been incorporated with a capital stock of $15,000 by J. F. Eng, H. A. Dumbey and others.

The Hiwassee Light & Power Company of Charleston, Tenn., has been incorporated by Dr. J. L. McClary, Edgar Edwards, J. C. Palmer, T. B. Saupaw and J. C. Epperson. The company proposes to supply electricity for lighting purposes in Ooltewah.

The Emerson Engineering Company of New York, N. Y., has been incorporated by Joseph F. Curtin, Samuel B. Howard and S. A. Anderson, all of New York City. The company is capitalized at $3,000,000 and intends to do a general mechanical, civil and electrical engineering business in all its branches.

The Essex Storage Electric Company of St. Johnsbury, Vt., has been incorporatd by Thoedore W. Chase of Passumpsic, Fred D. Gilman, Harry H. Carr, Freeman A. Pierce and Charles G. Braley of St. Johnsbury. The company is capitalized at $200,000 and will build a hydroelectric plant at Victory and furnish electricity in St. Johnsbury and near by towns.

The Tate Electro Waterprofing Corporation of New York, N. Y., has been incorporated with a capital stock of $25,000 to manufacture equipment and processes for treating all kinds of fabrics, leather, skins, etc., to render waterproof. The incorporators are: H. M. Ward, 829 Park Avenue; C. B. Knudsen, 126 West Seventy-third Street, New York, and R. F. Culver, 310 Rich Avenue, Mount Vernon, N. Y.

Trade Publications

Automobile Lamps.—The A. C. Manweiler Company, Fort Wayne, Ind., has brought out an illustrated folder descriptive of its nitrogen-filled automobile lamps.

Electric House Pumps.—Bulletin No. A-18, prepared by the Columbus Pump Company, Columbus, Ohio, contains information on several types of electrically operated house pumps.

Intermittent-Duty Controllers.—The Allen-Bradley Company, Milwaukee, Wis., has prepared Bulletin B-16, which is illustrated and describes its universal intermittent-duty controllers.

Check Valves.—The Smolensky Manufacturing Company, Cleveland, Ohio, has prepared an illustrated catalog which describes and illustrates several types of rotary suction and check valves.

Glass-Lighting-Fixture Clamps.—Ornamental clamps for use with glass bowls are described in a leaflet prepared by the J. H. White Manufacturing Company, 111 North Third Street, Brooklyn, N. Y.

Cleats, Staples and Tube Flux.—The Blake Signal & Manufacturing Company, 251 Causeway Street, Boston, Mass., has prepared illustrated circulars on its tube flux, insulated staples and compressed cleats.

Pole-Line Hardware.—The Barnes & Kobert Manufacturing Company, Milldale, Conn., has just issued a seventy-one page catalog which lists and illustrates numerous types of pressed-steel pole-line hardware.

Illuminated Porch Lamp.—Stanley & Patterson, 23 Murray Street, New York, are sending out an illustrated circular descriptive of their illuminated porch number, which can be attached to an ordinary electric porch lamp.

Vapor-Proof Fixture.—The Inland Electric Company, 14 North Franklin Street, Chicago, Ill., has prepared an illustrated folder descriptive of its style PVG2 vapor-proof lighting fixture, which is equipped with its "Steelite" armored cable.

Lighting Reflectors.—The National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, has issued a twenty-page booklet which shows many applications of "eye-comfort" lighting in offices and banks and which gives data on indirect lighting.

New England

DERRY, N. H.—The Derry Electric Company has been authorized to purchase the properties, rights and franchises of the New Hampshire Water & Light Company of Fitzwilliam and the Jaffrey & Troy Electric Company of Troy and to do business in Troy, Jaffrey and Fitzwilliam.

PROVIDENCE, R. I.—The installation of an entire new fire-alarm system in Providence, it is expected, will be recommended to the City Council by the committee on finance.

PROVIDENCE, R. I.—Preparations are being made by the Narragansett Electric Lighting Company for increasing the output of its Elm Street power plant. Contracts have been placed with the Westinghouse Electric & Manufacturing Company for a 45,000-kw. steam turbine.

WESTERLY, R. I.—The Westerly Light & Power Company has applied to the State Legislature for an amendment of its charter, increasing the capital stock of the company from $700,000 to $1,000,000.

MANSFIELD, CONN.—The contract for the construction of buildings for the Connecticut Training School for the Feeble-Minded at Mansfield has been awarded to Doyle & Murphy of Norwich. The contract calls for six buildings, including power house, 50 ft. by 73 ft.

NORWICH, CONN.—The electric light commissioners will ask the Common Council for an appropriation of $24,850 for improvements to the municipal electric light plant as follows: Two boilers, $14,900; two automatic stokers, $5,450; induced draft apparatus, $1,450; repairs, etc., $3,050.

ROCKVILLE, CONN.—Bids will be received by Mayor W. B. McHenry, Rochelle, Ill., until April 3, for furnishing electrically-driven pumping machinery and accessories. For details see proposal columns. W. H. Williams is city clerk.

TORRINGTON, CONN.—The Litchfield County Company is contemplating the construction of an electric railway from Torrington to Waterbury. A. J. Patton & Company of Waterbury are interested in the project.

Middle Atlantic

AUBURN, N. Y.—The Empire Gas & Electric Company of Geneva, which serves Geneva, Auburn, Seneca Falls, Waterloo, Phelphs, Newark, Palmyra, Lyons, Clyde and Weedsport, contemplates the installation of regulators in various generating and substations, substituting motor-driven centrifugal pumps for the present reciprocating boiler feed pumps in the generating station at Auburn and Geneva; rebuilding the 500-kw. hydroelectric plant at Lyons, installing new water wheels and generators, building a 1200-kw. outdoor substation at Geneva, reinsulating 20 miles of 13,200-volt transmission line to carry higher voltage and to install additional lightning protection devices throughout the territory. L. C. Reynolds is general superintendent.

JAMESTOWN, N. Y.—Bids will be received by the Board of Water and Light Commissioners of the city of Jamestown until April 12 for furnishing and installing one 1000-kw. turbine generator, condenser, and switchboard panel in accordance with specifications on file in the above office. For details see proposal columns.

NEW LEBANON, N. Y.—The Lebanon Valley Lighting Company has given up its plans to operate an electric generating plant in the Canaan Paper property and is now planning to secure energy through a transmission line from West Stockbridge, Mass., for distribution in the towns of Canaan and New Lebanon.

NEW YORK, N. Y.—Bids will be received by the board of health of the Department of Health, corner of Centre and Walker Streets, New York, until March 28 for furnishing electrical supplies as required to the Tuberculosis Sanatorium, Otisville, N. Y. Blank forms and further information may be obtained at the office of the chief clerk, Department of Health.

NEW YORK, N. Y.—Bids will be received by J. T. Fetherston, commissioner of street cleaning. Room 1247, Municipal Building, New York, until April 3 for furnishing the following: (1) Four tractors; (2) one gasoline engine; (3) one generator; (4) two driving motors. Bids will also be received at the same time and place for furnishing three gasoline electric tractors. Blanks, form drawings and further information may be obtained at the above office upon deposit of $15 for each set of plans.

CHARLEROI, PA.—Plans are being prepared by the Pittsburgh Coal Company for the erection of a power plant at Charleroi for power for its Black Diamond Mine.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

MEADVILLE, PA.—The Peoples' Incandescent Light Company of Meadville, with seven other electric companies, has been consolidated under the name of the Northwestern Electric Service of Pennsylvania.

NEW OXFORD, PA.—The Hanover & McSherrystown Light, Heat & Power Company of Hanover, has applied to the Borough Council for a ten-year franchise to furnish electricity in New Oxford. The company also asks for a street-lighting contract, consisting of 35 tungsten lamps of 60 cp., for a period of five years. C. W. Hepperle is manager of the company.

SELLERSVILLE, PA.—If the borough of Telford extends the borough limits, as anticipated, the Excelsior El. Lt., Pwr. & Gas Co., Sellersville, will install at least 30 additional arc lamps. Harold M. Hamel is superintendent.

WAYNESBORO, PA.—Plans are being considered by the Waynesboro Electric Light & Power Company for extension of its transmission lines to Mont Alto to supply electricity to the towns of Nunnery, Quincy, Good Siding, Knapper and Mont Alto.

CAMDEN, N. J.—Ornamental boulevard lamps have been provided for the entire length of the new boulevard proposed by the City Planning Commission, to extend from Baird Avenue and Cooper River to Twenty-seventh and Federal Streets.

PAULSBORO, N. J.—The Borough Council has decided to light the streets with electricity and discard the present gas street lamps. The American Ammunition Company has offered to furnish electricity for the new system.

WOODBINE, N. J.—The Woodbine Land & Improvement Company contemplates laying a concrete floor (1100 sq. ft.) in engine room and would like prices on cement floor paint and other material. W. E. Bertrand is superintendent.

DOVER, DEL.—The Town Council is contemplating the purchase of a 250-hp., four-valve engine and a 200-kw. generator for the municipal electric-light plant. The installation of new equipment together with other improvements will cost about $10,000.

HANCOCK, MD.—The installation of an electric-light plant in Hancock is under consideration. Roy Daniels is reported to be interested in the project.

HARPERS FERRY, W. VA.—Extensive improvements will be made by the Harpers Ferry Light & Power Company to meet the requirements of the Public Service Commission. A day service will also be established.

MARTINSBURG, W. VA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until April 20 for a conduit and wiring system, lighting fixtures, etc., in the United States post office at Martinsburg. For details see proposal columns.

STUART, VA.—The Clark Manufacturing Company, which proposes to supply electricity in Stuart has let contracts for the construction of a dam and power plant. The dam is located a little more than a mile from the town and will have an output of 125 hp.

VICTORIA, VA.—J. Parker Green, proprietor of the Victoria ice, light and power plant, would like prices, etc., on a 25-kw. or 50-kw., 60-cycle, single or two-phase, 2200-volt generator, exciter and switchboard.

WASHINGTON, D. C.—Bids will be received at the office of the chief signal officer, United States Army, War Department, Washington, D. C., for furnishing under proposal 793, 250 telephones, battery commanders, common battery type. For further information address Charles S. Wallace, captain, signal corps, U. S. Army, Washington, D. C.

WASHINGTON, D. C.—A bill appropriating $25,000,000 for nitrate plants for military as well as commercial purposes has been recommended to the Senate committee on agriculture by Thomas H. Norton, special agent of the department of commerce. He suggests that one plant be located near the junction of three States, North Carolina, Tennessee and Georgia; another in western Pennsylvania and the third in the West. A bill for a plant for nitrates is pending in the House of Representatives, having been introduced by Mr. Hay, which appropriates $20,000,000 for the purpose.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for furnishing at the various navy yards and naval stations supplies as follows: Washington, D. C., Schedule 9445—three 35-kw., oil-cooled transformers. Boston, Mass., Schedule 9451—miscellaneous pipe lead for lining steel tubing, miscellaneous standard steel pipe and miscellaneous steel tubing; Schedule 9452 2080—transmitting condensers, miscellaneous antenna wire. Newport, R. I., Schedule 9445—50,000 ft. double-conductor cable; Schedule 9435—1000 steel forgings (turbine wheels). Philadelphia, Pa., Schedule 9444—1631 ft. three-conductor cable; Schedule 9451 30—bells for power boats. Puget Sound, Wash., Schedule 9439—six motors; Schedule 9457—one blower. Mare Island, Cal., Schedule 9456—nine ¼-hp. ventilating sets; Schedule 9447—one crank shaft and steam turbine lathe, one head planer and horizontal boring, drilling and milling machine. Brooklyn, N. Y., Schedule 9442—5050 lb. copper wire; Schedule 9461—one beveling machine. Norfolk, Va., Schedule 9434—one single cylinder surfacer, F.o.b. works; Schedule 9443—308,200 ft. phosphor bronze wire. Applications for proposals should designate the schedule desired by number.

WASHINGTON, D. C.—Foreign trade opportunities are announced by the Bureau of Commerce reports as follows: No. 20,282—An American consular officer in India reports that a man in his district desires to be placed in touch with American manufacturers of steam engines, chimneys of steel and brick, calorimeters, thermometers, gages, cocks, etc. No. 20,286—A special agent of the bureau reports that a firm in South Africa desires to establish commercial relations with American manufacturers of railway coaches and trucks, etc.; signaling devices, copper tubing and sheeting for boilers, etc. No. 20,288—A firm in Japan writes that it desires to receive catalogs and cash quotations from American manufacturers of iron, steel and wire hardware products of all kinds; electrical equipment and supplies, etc. No. 20,297—An American consular officer in India reports that a firm in his district desires to be placed in touch with American manufacturers of street railway supplies. No. 20,302—An American consular officer in Italy reports that a man in his district desires to represent American manufacturers and exporters of electrical supplies, agricultural machinery, etc. No. 20,325—A firm in Norway writes that it is in the market for air compressors, galvanized iron wire, drilling machines, wire rope, guide wire, steel wire, underground cable, phosphor bronze wire for paper machines, etc. No. 20,360—An American consular officer in France reports that a firm in his district desires to represent American manufacturers of incandescent electric lamps. No. 20,362—A man in Spain informs an American consular officer that he desires to purchase raw materials for the manufacture of incandescent electric lamps, as well as machinery and apparatus in making such lamps. No. 20,422—A firm in England writes that it desires to communicate with American manufacturers of electric lamps. No. 20,435—A firm in England writes that it desires to purchase insulating materials such as press-spahn, varnished cambric and vulcanized fiber. No. 20,464—A firm in Spain informs an American consular officer that it desires to purchase steam and water turbines, gas, gasoline and crude oil motors, electric machinery of all kinds, including copper and aluminum cables, wire, meters, etc.; and pumps of all kinds. Correspondence may be in English. Further information may be obtained on application to the Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

North Central

BANGOR, MICH.—A coal conveyor for coal from track to sheds (150 ft. apart), also a water heater and oil separator combined, is needed for the municipal electric-light plant. P. M. Gross is superintendent.

BOYNE CITY, MICH.—Plans are being considered for the installation of ornamental lamps on the five blocks in the business section. As yet nothing definite has been decided upon. Charles T. McCutcheon is superintendent.

BUCHANAN, MICH.—The Indiana & Michigan Electric Company, South Bend, Ind., has recently installed a new switchboard in its local plant and is making extensive line repairs. H. W. Riley is local superintendent.

DETROIT, MICH.—Bids will be received at the office of Charles A. Gadd, secretary of board of education, 50 Broadway, Dertoit, until April 4, for furnishing material and construction of a 20-room

school house building, to be located on Holmur Avenue, between Maidstone and Euclid Avenues, including general masonry work, carpentry work, heating, ventilating and plumbing, and electric wiring. Bids will also be received for separate classes of the work. Plans and specifications may be seen at the office of Malcolmson & Higginbotham, architects, Moffat Building, and at the office of Ammerman & McColl, engineers, Penobscot Building, Detroit. Plans may be obtained upon deposit of $10.

DOWAGIAC, MICH.—The Beckwith Estate, electric-light department, Dowagiac, expects to install a 500-kw. or 1000-kw. turbine and switchboard in its plant this year. G. M. White is manager.

DUNDEE, MICH.—The Dundee Power Company is contemplating making some changes in its plant some time in 1917, which will include the installation of generators, exciters and oil engines. Harry G. Grey is manager.

ELK RAPIDS, MICH.—Work will begin by the Elk Electric Company on construction of a new dam and power house as soon as weather conditions will permit. The plans provide for an ultimate installation of four water wheels. Only one wheel will be installed at first.

HOWELL, MICH.—A new boiler may possibly be installed and a smoke stack erected at the municipal electric light plant. L. P. Melendy is clerk of board of public works.

MARQUETTE, MICH.—Plans are being considered for increasing the output of the municipal electric light and power plant on Dead River at a cost of $50,000.

ST. CHARLES, MICH.—Improvements are contemplated to the municipal electric-light plant, including the installation of boiler feed pumps, a 35-kva. generator and engine; line wire, poles and a new street-lighting system to replace the present arc lamps. George E. Tigner is superintendent.

AKRON, OHIO.—The Akron & Youngstown Electric Railway Company, recently incorporated with a capital stock of $100,000 (later to be increased to $5,000,000), has awarded the contract for the construction of an electric railway between Akron and Youngstown, a distance of about 50 miles, to H. D. McCutcheon & Company, Shannon Building, Fourth Avenue, Pittsburgh, Pa. The contract includes the construction and equipment of the line. The cost is estimated at $3,000,000, exclusive of terminal facilities. Thomas L. Childs of Akron is president, and H. D. McCutcheon of Pittsburgh is vice-president.

CANTON, OHIO.—The name of the Canton Electric Company has been changed to the Central Power Company and an increase in the capital stock from $2,500,000 to $12,500,000 has been authorized by the stockholders. The company proposes to acquire a number of power companies operating in central Ohio.

CLEVELAND, OHIO.—The Cleveland Railway Company has applied to the City Commissioners for permission to rebuild and enlarge the Cedar Avenue power station, at a cost of $345,000.

LIMA, OHIO.—A considerable amount of electrical equipment will be required in the construction of a large garage to be erected by Henry Mack, which will include a repair shop.

MIDDLETOWN, OHIO.—The Ohio Electric & Gas Company, which was recently organized at Lisbon, Ohio, by Charles Monroe of Chicago, Ill., and others, will erect a large power plant to supply electricity to a number of cities and towns in the Miami Valley. The company has acquired the property of the Middletown Gas & Electric Company and the Franklin Electric Company and plans to take over the Lisbon and Leetonia plants.

QUINCY, OHIO.—The installation of an electric-lighting plant in Quincy is under consideration by the City Council.

READING, OHIO.—Bids will be received by the board of education until April 5 for electrical and other work on the new Reading Public School. Separate bids may be submitted on the several branches of the work. George W. Fricke is clerk of board.

SANDUSKY, OHIO.—Preparations are being made by the Sandusky Gas & Electric Company for the erection of 2 miles of line at once to supply electricity to farmers living south of the city. E. A. Bechstein is general manager.

SPRINGFIELD, OHIO.—The new Hotel Shawnee is to be equipped with a complete electric clock system, as well as the usual telephone and telegraph lines.

NEWPORT, KY.—Preliminary surveys are being made by the Newport & Alexandria Railroad for the proposed electric railway, which will follow Licking Pike to Three-Mile Creek, thence along Creek Valley to parallel the pike to Alexandria.

DECATUR, IND.—The city of Decatur is contemplating the purchase of a 500-kw. turbine for the municipal electric-light plant. M. J. Mylott is superintendent.

GARY, IND.—The Gary Heat, Light & Water Company is planning to change its rectifier sets from single to double tube sets. Leonard Fitzgerald is vice-president.

GAS CITY, IND.—Improvements are contemplated to the municipal electric-light plant, including the installation of one 125-kva., three-phase, 60-cycle, 2300-volt, engine type, revolving field generator and also a battery charging outfit. T. S. McGee is superintendent.

BRIGHTON, ILL.—The Council has granted Arthur Farrell a franchise to install and operate an electric-light and power plant in Brighton.

FRANKLIN, ILL.—The Illinois Public Utilities Commission has approved a contract for the sale of the power plant at Franklin to the Central Illinois Public Service Company of Mattoon and has granted a certificate of convenience and necessity to the company to supply electricity in that village.

HARDIN, ILL.—Application has been made to the town of Hardin by Peter A. Gotway for the installation of an electric-lighting plant.

HARRISBURG, ILL.—The Southern Illinois Railway & Power Company, Harrisburg, is enlarging its power station and is installing one 5000-kw. Allis-Chalmers turbine, two boilers of 750 hp. each, three-stage turbine-driven boiler-feed pumps, Worthington surface condenser, combined rotary centrifugal cooling-water pump, dry and wet vacuum pump (turbine-driven). C. F. Richardson is general superintendent.

JACKSONVILLE, ILL.—An election will be held April 18 to submit to the voters the proposal to issue $100,000 in bonds for improvements to the municipal electric-light plant and water-works system.

MOLINE, ILL.—Improvements are being made by the Peoples Power Company of Moline, including the installation of three 5000-kva., duplex, water-cooled, oil-insulated, 4800-volt, two-phase to 13,200-volt, three-phase transformers; the erection of 4800-volt and 13,200-volt bus structures, switches, lightning arresters, etc., at Moline power house to change voltage on transmission lines to East Moline, Ill. and Davenport, Iowa, from two phase, 4800 volts to three phase, 13,200 volts; also three 2500-kva. transformers, same as above, with bus structure, etc., at East Moline substation. D. G. Porter is assistant general manager.

OLNEY, ILL.—The city officials are considering a proposal to install a municipal electric-lighting plant.

PEKIN, ILL.—The Central Illinois Light Company of Pekin is contemplating the installation of a motor-generator set to supply electricity for street railway service and rebuilding part of its pole lines. F. C. Heiple is superintendent.

SPRINGFIELD, ILL.—The installation of an ornamental lighting system on Fifth Street from Capital Avenue to Washington Street is under consideration by the property owners. Ordinances providing for the installation of ornamental lamps on Washington and Monroe Streets have been submitted to the City Commission.

JANESVILLE, WIS.—The Jones & Madison Traction Company is contemplating the construction of an electric railway from Janesville to Portage, via Madison.

NORTH MILWAUKEE, WIS.—The North Milwaukee Light & Power Company is securing rights of way for its proposed transmission line from North Milwaukee to Granville. S. B. Way is president.

OOSTBURG, WIS.—The Oostburg Light & Power Company, recently organized with a capital stock of $10,000, proposes to install an electric-light plant in Oostburg. H. W. LeMahieu, L. LeMahieu and John Berthouwer are interested in the company.

RACINE, WIS.—The City Council has voted to accept the proposal of the Milwaukee Electric Railway & Light Company for street-lighting. The contract provides for the installation of 700 lamps and equipment, at a cost of about $62,294.

FARIBAULT, MINN.—The Northern States Power Company, Faribault division, has secured a five-year contract from the Faribault Packing & Provision Company to furnish electrical energy (360 hp.) for its new plant, now being erected in Faribault.

HOFFMAN, MINN.—The village of Hoffman is considering the installation of a municipal electric-lighting plant.

JACKSON, MINN.—Bonds to the amount of $30,000 have been voted for extensions and improvements to the municipal electric-light plant and lighting system.

CLARKSVILLE, IOWA.—The Cedar Valley Electric Company, Clarksville, is erecting a 33,000-volt transmission line, which will be completed about April 1. R. F. Burkhort is district superintendent.

DUBUQUE, IOWA.—The Union Electric Company of Dubuque has closed a contract with the Interstate Light & Power Company of Galena, Ill., to furnish electricity for lamps and motors in the mining district of southwestern Wisconsin, which includes, among others, the towns of Platteville, Benton, Cuba City and Hazel Green. In order to fulfill this contract the Union Electric Company will erect a cable across the Mississippi River, 2200 ft. in length, on steel towers 125 ft. high. This line will be extended along the Wisconsin-Illinois State line about 6 miles east, where it will connect with the lines of the Interstate company.

HOPKINTON, IOWA.—W. A. Milroy, owner of the local electric-light plant, expects to install a 75-kva, 60-cycle, 2300-volt generator, directly connected to water-wheel shaft.

MALVERN, IOWA.—The Malvern Light & Power Company is erecting about 18 miles of transmission line for rural service; also a transmission line from Tabor to Sidney, a distance of 12 miles. H. F. Boehner is secretary and manager.

NEWELL, IOWA.—At an election to be held March 27 the proposal to grant a franchise to the Storm Lake (Iowa) Light & Power Company to supply electricity in Newell will be submitted to the voters.

NEWTON, IOWA.—The city of Newton is contemplating the erection of a 6-mile, three-phase, 2300-volt transmission line to the water-works station. C. O'Leary is superintendent.

OXFORD JUNCTION, IOWA.—Plans are being considered by the local electric light company to extend its transmission lines to supply electrical service to all small towns between Cedar Rapids and Clinton. Walter Coon is manager.

WEST BRANCH, IOWA.—The West Branch Electric Light Company may change its system from direct-current to alternating-current system. Nothing definite as yet has been decided upon. B. A. Gill is president.

COLUMBIA, MO.—Interests connected with the Keokuk & Hamilton Power Company, it is reported, contemplate building an electric railway from St. Louis to Kansas City, via St. Charles and Fayette, a distance of about 250 miles.

COWGILL, MO.—The Excelsior Springs (Mo.) Water, Gas & Electric Company contemplates extending its transmission line from Polo to Cogwill and installing a distribution system in Gowgill.

POPLAR BLUFF, MO.—Bids will be received until April 17 for furnishing electrical supplies for the municipal electric-light plant, including line materials, etc. H. H. Wilcox is city clerk.

ST. LOUIS, MO.—In an opinion given to the Board of Public Service by City Counselor Daues the Cupples Light, Heat & Power Company may lay underground conduits on Newstead Avenue, south of Olive Street, in accordance with a conditional permit granted by the board. The Cupples company has obtained permits to erect more than 20 miles of overhead wires in the West End. The Laclede Gas Light Company has also asked for permission to lay underground conduits, which will probably be granted.

WESTHOPE, N. D.—The City Council has granted C. M. Condit a franchise to install and operate an electric-light and power plant in Westhope.

PEEVER, S. D.—The installation of an electric-lighting system in Peever is under consideration by local business men.

PIERRE, S. D.—The Missouri River Power Company, recently incorporated with a capital stock of $1,000,000, contemplates a power development at Big Bend in the Missouri River, several miles below this city. The incorporators are: J. E. Mallery, Doane Robinson and Harry Quackenbush of Pierre. The headquarters of the company are located in Pierre.

BLAIR, NEB.—After May 1, 1916, the local plant of the Nebraska Gas & Electric Company will be closed down. The city is installing a municipal electric plant and has purchased the distributing system of the company.

DAYKIN, NEB.—The installation of a municipal electric-light plant in Daykin is under consideration.

BARNES, KAN.—The installation of an electric distribution system is under consideration by the town officials. Energy to operate the system will be secured from the Concordia (Kan.) Electric Company.

EUDORA, KAN.—Bonds to the amount of $10,000 have been voted for the installation of a municipal electric-light plant in Eudora.

NEOSHO RAPIDS, KAN.—The installation of an electric-lighting plant in Neosho Rapids is contemplated by the Emporia Telephone Company. W. W. Finney is proprietor.

SYLVIA, KAN.—At an election to be held March 28 the proposal to issue $5,000 in bonds for the installation of an electric-lighting system will be submitted to the voters.

WAKEENEY, KAN.—The town of Wakeeney will ask for bids in April for equipment of the municipal electric-light plant as follows: one 80-hp. oil engine, two alternators with exciters, one switchboard complete and a triplex motor-driven pump. H. C. Johnson is city engineer.

WAMEGO, KAN.—Within the next thirty days the Light and Water Department expects to purchase motor, transformer, controlling apparatus and pumping equipment for supplying an artificial lake in the City Park. The purchase of a voltage regulator is also under consideration. Moving pole lines from streets to alleys in certain districts, which will require pole line material, wire, etc., is also being considered. D. A. Course is superintendent of the light and water department.

Southern States

NASHVILLE, N. C.—The city of Nashville has engaged the J. B. McCrary Company of Atlanta, Ga., to prepare plans and superintend the construction of the municipal electric-light plant for which bonds were recently issued.

DUE WEST, S. C.—H. A. Orr, local manager of the Anderson branch of the Southern Public Utilities Company, is negotiating with the town officials relative to the installation of an electric-lighting system in Due West.

HAYNE (Not a post office), S. C.—The Southern Railway Company is planning to erect a substation, probably near Hayne, to supply electricity to operate the signal system for double track road, between Spartanburg and Central, now under construction. W. H. Wells of Washington, D. C., is chief engineer of construction.

CORDELE, GA.—Plans are being considered by the city of Cordele for the construction of an electric-light plant in connection with the municipal water-works plant, to cost about $50,000. Surveys are being made and plans prepared by C. F. Wagner, city engineer. The proposal to issue bonds for the above work will be submitted to the voters.

METTER, GA.—At an election to be held March 30 the proposal to issue $8,500 in bonds will be submitted to the voters.

DE FUNIAK SPRINGS, FLA.—At an election to be held April 4 the proposal to issue $5,000 in bonds for extension to the electric-lighting system will be submitted to the voters.

OPELIKA, ALA.—Plans are being considered for the installation of an ornamental street-lighting system on Eighth and Ninth Streets.

NEWPORT, ARK.—The capital stock of the Newport Water, Light & Power Company has been increased from $100,000 to $125,000.

ALTUS, OKLA.—Preparations are being made for extensive line improvements to the municipal lighting system, for which material has been purchased. The City Water and Light Department is planning a thorough campaign for new business in all departments. Charles H. Welch is superintendent.

DURANT, OKLA.—The holdings of the Durant Ice & Light Company have been purchased by William A. Baehr and associates of Chicago, Ill. Mr. Baehr has been elected president of the company.

CLEBURNE, TEX.—The Cleburne Traction Company, recently incorporated with a capital stock of $15,000, proposes to supply electricity for lamps and motors and operate an electric street railway in Cleburne.

COMMERCE, TEX.—Arrangements have been made by the Texas Power & Light Company to extend its transmission line, now being erected from Jenkins to Royse City, to Commerce, connecting here with the present transmission line which connects Paris, Bonham, Ladonia and other towns. This line will connect the Paris-Bonham-Commerce district with the central Texas transmission system of the company.

FLOYDADA, TEX. — Application has been made to the City Council by T. B. Harman and others of Tarrant County for a franchise to establish an electric-light plant in Floydada.

GUNTER, TEX.—The Gunter Light & Power Company, it is reported, is contemplating the construction of an electric-lighting plant.

HOUSTON, TEX.—Contracts will soon be awarded for the construction of wharf No. 4, to cost about $400,000. The wharf will be equipped with a 20-ton traveling crane, to be operated by electricity.

IRENE, TEX.—The Texas Power & Light Company of Dallas is contemplating extending its transmission lines from Mertens to Irene. If the plans are carried through a 24-hour service will be established in Irene.

McKINNEY, TEX.—The Texas Power & Light Company of Dallas, which recently purchased the municipal electric-light plant and the electric plant of the McKinney Ice, Light & Coal Company, is planning to extend the lighting system. The Texas company will take charge April 1.

NIXON, TEX.—The city officials have granted J. R. Wood, Jr., and Carl Borens of Gonzales a franchise to install and operate an electric-light plant in Nixon.

SHINER, TEX.—The City Council has called an election to be held April 18 to submit to the voters the proposal to issue $12,000 in bonds for the purpose of installing an electric-light plant or purchasing the present plant now operating here.

Pacific States

COUPEVILLE, WASH.—Preparations are being made by W. C. Cheney, owner of the local electric-light plant, for extensions and improvements to the system. The work, it is understood, will be done this spring.

LACROSSE, WASH.—Application has been made to the Commissioners of Whitman County by Harry C. Wilson for a franchise to construct and operate an electric-light and power system in the town of Lacrosse.

OAKVILLE, WASH.—The City Council, it is reported, contemplates the purchase of the plant of the Oakville Electric Light & Power Company. If taken over by the municipality extensions and improvements will be made to the system.

MYRTLE CREEK, ORE. — The City Council has engaged engineers to make investigations and report on the installation of a power project on South Umpqua River near the mouth of Myrtle Creek.

WEST LINN, ORE.—The Portland Railway, Light & Power Company has applied to the Town Counsel for a franchise to erect transmission lines to supply electricity in the suburbs of Oregon City across the river. In return for the franchise the company offers 18 street lamps in the town of West Linn free of charge. The Town Council asks for 30 lamps in return for the franchise.

ANAHEIM, CAL.—The Council has awarded the contract for furnishing electrical energy for the municipal electric-light system to the Southern California Edison Company.

LOS ANGELES, CAL.—The Sespe Light & Power Company of Los Angeles, which applied to the State Water Commission sometime ago for an appropriation of water for the purposes of irrigating 30,000 acres of land in Ventura County, has made a separate application for 125 second-feet of water for power purposes, to be used to generate electricity for commercial purposes. The project includes a main canal and pipeline 9 miles long, a diversion dam 175 ft. high, 220 ft. on top and 75 ft. on bottom. It has a storage reservoir of 57,750 acre-feet. By a fall of approximately 1000 ft. it is estimated that about 3000 hp. can be developed. The cost of the Sespe project is estimated at $2,000,000.

SANTA MARIA, CAL.—Arrangements have been completed, it is reported, by the Midland Counties Public Service Corporation for the transfer of its local power station to Betteravia, where it is proposed to erect new buildings and install new equipment, at a cost of about $175,000. This change is made, it is stated, owing to a large contract obtained from the Union Sugar Company for electrical service.

SENECA, CAL.—Application has been made to the State Water Commission by W. L. Shafer of Seneca for permission to appropriate 1600 miners' inches from the North Fork of Feather River for mining and milling purposes. The project includes a concrete and masonry dam, with ditch, pipe line and flume 2 miles long, and an electric plant, to cost about $45,000.

PROVO, UTAH.—The Utah Power & Light Company will soon begin work on the erection of a 44,000-volt transmission line from Provo to Price, and other points in Carbon County, 75 miles long, to furnish energy to the coal mines in that district. M. Cheever of Salt Lake City is chief engineer.

BIG SANDY, MONT.—The Great Falls Power Company of Great Falls, it is reported, will extend its transmission lines in Big Sandy to the Riney Addition immediately.

CHOTEAU, MONT.—Bids will be received until April 3 for the installation of an electric lighting system, including 26 single lamp posts, 40 street hoods, 6000 ft. Park and suburban cable. Plans are on file in the office of the town engineer. L. A. Foot is clerk.

COKEVILLE, WYO.—William E. Pitt of Kemmerer has applied to the town of Cokeville for a franchise to install and operate an electric-light plant in Cokeville. The installation of a municipal electric-light plant is also under consideration.

THERMOPOLIS, WYO.—The Hot Springs Light & Power Company, Thermopolis, wishes to sell $100,000 in bonds, the proceeds to be used for improvements to its hydroelectric power plant and for refunding purposes. For details see proposal columns.

ROCKY FORD, COL.—The Arkansas Valley Railway, Light & Power Company is planning to extend its transmission lines from Holbrook to Cheraw, a distance of about 8 miles, and from Manzanola to Crowley, a distance of 7 miles. The cost of the work is estimated at about $25,000. F. S. Johnson is local superintendent.

CLOVIS, N. M.—At an election to be held April 4 the proposal to issue $35,000 for extension to the municipal electric-light plant and water-works system will be submitted to the voters. George W. Chalfant is superintendent.

LAS CRUCES, N. M.—The Elephant Butte Water Users' Association is considering the installation of a 400-hp. hydroelectric plant in the irrigation canal near Leasburg diversion dam, about 15 miles north of Las Cruces.

Canada

EDMONTON, ALTA.—The installation of an electric-light and power plant in Edmonton is contemplated by the Alliance Trust Company of Calgary. R. B. Bennett, president and George Robinson, manager of the Alliance Trust Company, propose to organize a separate company to operate the system, and seeks a franchise here for 25 or 30 years.

ST. MARYS, ONT.—Tenders will be called for a 2,000,000-gal. centrifugal pump driven by a 1500 r.p.m marine type, gasoline engine for standby unit in the municipal water works station. The Hydro Electric Power Commission of Ontario has charge of the engineering work. H. M. Miller is secretary and manager.

SUDBURY, ONT.—The electric light commission contemplates enlarging and remodeling the switchboard and installing an automatic voltage regulator at the municipal electric-light plant, at a cost of about $5,000. Extensions to the street-lighting system, consisting of 34 series street lamps of 100 cp. on brackets, is contemplated. R. H. Martindale is manager.

Miscellaneous

VALDEZ, ALASKA.—The Inter-Mountain Traction & Power Company, it is reported, has been organized to utilize the power generated at the Iles power plant, located on Solomon Gulch, across the bay from Valdez. The new company, it is understood, will furnish electricity for lamps and motors in Valdez at an early date and that the service will be extended to both the business and resident district. Energy will also be supplied to operate the machinery in many of the mines in this district. Alfred B. Iles is manager of the Iles plant.

PANAMA.—Bids will be received at the office of the general purchasing officer, the Panama Canal, Washington, D. C., until April 8 for furnishing laundry washers, track frogs, switches, switch stands, steel plates and billets, bronze bars, sheet copper, copper tubing, zinc plate, cable clips, vises, marine lamps, watt-hour meters, panel boards, marine fixtures, electrical fittings, etc. Blanks and general information relating to this circular (No. 1023) may be obtained from the above office or the offices of the assistant purchasing agents, 24 State Street, New York, N. Y.; 614 Whitney-Central Building, New Orleans, La., and Fort Mason, San Francisco, Cal.

1,174,956. Player for Sound-Producing Devices; D. W. Barton, Oshkosh, Wis. App. filed April 21, 1913. For playing drums, triangles, storm effects, etc.

1,174,957. Piano Attachment; D. W. Barton, Oshkosh, Wis. App. filed May 7, 1913. For ringing bells and the like.

1,174,958. Means for Insulating Electromagnets; D. W. Barton, Oshkosh, Wis. App. filed May 16, 1913. Designed particularly for electrically-played musical instruments.

1,174,969. Signal Transmitter; W. J. Davis and D. G. Knitel, Pittsburgh and Wildwood, Pa. App. filed Jan. 2, 1915. Police and fire—will not send incorrect signal.

1,174,974. Electric Switch; L. H. Ford, Abilene, Kan. App. filed Feb. 13, 1915. Operable from a plurality of stations, as for use in a shop.

1,175,007. Fixation of Nitrogen; H. R. Moody and S. A. Tucker, New York, N. Y. App. filed Jan. 15, 1913. Introduces vaporous calcium with free carbon into nitrogen atmosphere.

1,175,010. Thermostat; E. M. Petersohm, Chicago, Ill. App. filed March 17, 1915. Easily regulatable, particularly for fire-alarm purposes.

1,175,047. Multiple Pump-Controlling Device; H. S. Clark, Berkeley, Cal. App. filed March 11, 1914. For use on electric cars.

1,175,048. Transmitter; J. J. Comer, Chicago, Ill. App. filed March 31, 1913. Diaphram is not damped.

1,175,051. Signaling Device for Automobiles; R. F. Darrow, East Chicago, Ind. App. filed Aug. 13, 1915. Signal plates operated by electromagnets.

1,175,052. Plug and Socket; J. N. Davis, Denver, Col. App. filed Feb. 16, 1914. For charging storage batteries.

1,175,053. Electropneumatic Brake; J. S. Doyle, Mt. Vernon, N. Y. App. filed April 23, 1910. Utilizes current supplied by the motor running as a generator.

1,175,059. Accounting System; F. O. Heuster, Chicago, Ill. App. filed Jan. 3, 1910. For calculating production in manufacturing plants (eighty-eight claims).

1,175,078. Insulator Supporting Fixture; C. L. Pierce, Jr., Pittsburgh, Pa. App. filed May 4, 1914. Adapted for mounting on pole.

1,175,082. Apparatus for the Electric Transmission of Signs or Speech in Mines; J. H. Reineke, Bochum, Germany. App. filed July 16, 1912. Uses rails, pipes and other conductors as parts of system.

1,175,086. Electrical Signaling Device; E. E. Salisbury, Chicago, Ill. App. filed Aug. 17, 1914. For calling persons in a large manufacturing plant.

1,175,089. Safety Device for Cars; W. V. Turner, Edgewood, Pa. App. filed Oct. 24, 1914. Prevents starting of train while brakes remain on.

1,175,103. Pothead Cut-Out; P. F. Williams, Chicago, Ill. App. filed Feb. 23, 1909. Cut-out device connected with the sealed cables.

1,175,104. Telephone System; B. D. Willis, Chicago, Ill. App. filed April 18, 1913. Improved trunking arranged.

1,175,111. Means for Preventing Inductive Disturbance in the Test-Circuits of Telephone Switchboards; H. M. Bascom, Brooklyn, N. Y. App. filed June 21, 1915. Prevents production of noise in the receiver.

1,175,112. Telephone System; H. M. Bascom, Brooklyn, N. Y. App. filed July 1, 1915. Increased transmission efficiency.

1,175,119. Automatic Telephone Switching Apparatus; A. H. Blessing, Chicago, Ill. App. filed March 29, 1912. Improved connection switch (forty claims).

1,175,177. Controlling Device for Variable-Speed Electric Motors; C. Redfield, Ogden, Utah. App. filed July 7, 1915. Compensating or inductance coils with variable magnetic circuit.

1,175,205. Tape Graphophone; I. S. and T. B. Turner, Centralia, Wash. App. filed July 12, 1915. Penticion Butsh, Col. Phonographic record is made on endless tape.

1,175,220. Door-Controlled Elevator System; A. and C. Beck, St. Louis, Mo. App. filed March 5, 1914. Motor circuit broken by the opening of any door.

1,175,222. Phase Modifying Apparatus; H. J. Blakeslee, Syracuse, N. Y. App. filed March 8, 1912. Testing A.C. meters.

1,175,234. Electric Water-Heater; G. A. Burroughs and W. Grant, Sudbury, Ontario, Canada. App. filed Jan. 9, 1913. Water remains hot a considerable time after current is turned off.

Record of Electrical Patents

Notes on United States Patents issued March 14, 1916, prepared by Mitchell & Allyn, 41 Park Row, New York.

1,175,241. Automatic Train Signal; W. J. Cook, Denver, Col. App. filed June 15, 1911. Track signal construction.

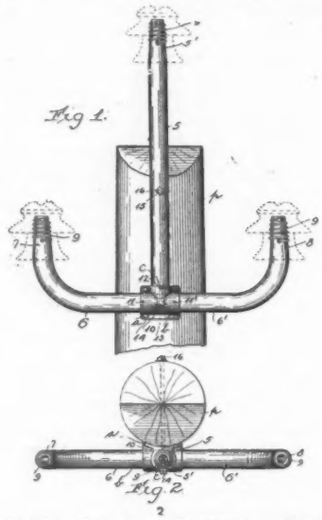
1,175,252. Method of Producing Rotating Electric Arcs; A. Foss, Christiania, Norway. App. filed Sept. 15, 1913. Gaseous surface of revolution supports the arc.

1,175,268. Underrunning Trolley System for Electric Cars; J. Joyce, Oswego, N. Y. App. filed Jan. 25, 1915. Trolley and feed wires within hollow sectional rail.

1,175,279. Switch; A. J. Logun, West Allis, Wis. App. filed Jan. 16, 1911. Secures great pressure and good contact with but little power.

1,175,280. Storage Battery; J. O. Luthy, Antonio, Tex. App. filed July 28, 1914. Of the so-called dry type.

1,175,295. System of and Apparatus for the Control of Electric Motors; C. V. Raper, Bavay, France. App. filed March 17, 1911. Designed for planing machines.



1,175,078. Insulator Supporting Fixture

1,175,305. Trolley Supporting Mechanism; W. Schaake, Pittsburgh, Pa. App. filed June 5, 1913. For mine locomotives.

1,175,308. Electric Switch; H. R. Schultz, Trafford Park, Manchester, England. App. filed July 22, 1910. "Underload" type.

1,175,311. Terminal; H. B. Sherman, Battle Creek, Mich. App. filed May 29, 1915. Eyelet inserted in hole in flattened shank of terminal.

1,175,313. Transmission of Pictures of Moving Objects; A. Sinding-Larsen, Christiania, Norway. App. filed June 10, 1911. Wire transmission of pictures.

1,175,320. System of Distribution; T. W. Varley, Pittsburgh, Pa. App. filed, Mar 3, 1912. Transforms three-phase into twelve-phase currents and vice versa.

1,175,321. System of Electric-Motor Control; T. Varney, Pittsburgh, Pa. App. filed Aug. 12, 1912. Series of lock-out oscillating switch.

1,175,322. System of Electric-Motor Control; H. C. Walter, Pittsburgh, Pa. App. filed May 27, 1912. Automatic regulation of current in regenerative braking circuit.

1,175,323. Electromagnet and Electrically Operated Switch; R. Wikander, Pittsburgh, Pa. App. filed March 23, 1911. Operates only when current falls within predetermined limits.

1,175,330. Circuit-Breaker; J. L. Adams, Jr., Wilkinsburg, Pa. App. filed Dec. 5, 1910. For tying together adjacent segregated sections of third-rail.

1,175,333. Starting Device for Automobiles; H. L. Beach, Edgewood Park, Pa. App. filed March 20, 1913. Prevents engagement of starting gears when engine is turning above a predetermined speed.

1,175,335. Fuse-Tester; H. A. Bremer, Jr., Jersey City, N. J. App. filed June 18, 1914. Embodies spring devices between which cartridge fuse can be inserted.

1,175,339. Signaling System; W. Churchill and A. H. Rudd, Corning, N. Y. App. filed July 13, 1914, Media, Pa. Uses lights in different positions both day and night for railway signaling.

1,175,342. Plug-Connector; F. Conrad, Swissvale, Pa. App. filed June 11, 1915. Prevents relative rotation between plug and socket.

1,175,344. Electrical System; A. W. Copley and B. D. Kunkle, Wilkinsburg, Pa. App. filed Dec. 18, 1914. Control of starting and ignition circuits.

1,175,346. Control System for Electric Motors; R. J. Dearborn, Wilkinsburg, Pa. App. filed July 17, 1912. For cranes and hoists.

1,175,350. Hoist Operating and Controlling System; E. Friedlander, Braddock, Pa. App. filed April 23, 1913. Particularly for skip hoist of blast furnaces.

1,175,358. Starting Apparatus for Electric Motors; H. D. James, Pittsburgh, Pa. App. filed Feb. 21, 1911. Switches for excluding resistance step by step.

1,175,359. System of Motor Control; H. D. James, Edgewood, Pa. App. filed Aug. 2, 1913. Particularly for printing presses.

1,175,362. Ignition System; B. D. Kunkle, Wilkinsburgh, Pa. App. filed Nov. 25, 1914. Current diversing interrupter is periodically reversed.

1,175,367. Motor-Control System; W. O. Lum, Wilkinsburg, Pa. App. filed March 30, 1914. For pipe rolling machines.

1,175,368. Controller for Elevators; B. McInerny, Council Bluffs, Iowa. App. filed Aug. 3, 1912. Interlocked station switches.

1,175,370. Secondary Battery Electrode and Process of Making the Same; William Morrison, Des Moines, Iowa. App. filed Sept. 11, 1914. Electrode superficially permeated with tutanum compound.

1,175,377. Motor Vehicle; J. W. Pearson, Chicago, Ill. App. filed June 22, 1911. Motor-driven generator provides current for propelling motors.

1,175,378. Circuit-Controller; H. P. Reed, Milwaukee, Wis. App. filed June 13, 1913. Over-load tripping means ineffective at starting.

1,175,396. Telephone System with Service-Meters; G. D. Wolf, Chicago. Ill. App. filed May 21, 1914. Embodies meters registering completed and uncompleted calls.

1,175,405. Automatic Signal Device; G. E. Blinn, Philadelphia, Pa. App. filed Sept. 6, 1914. For locating persons in the factory who are wanted at the office.

1,175,418. Wireless Telegraphy; R. A. Fessenden, Brant Rock, Mass. App. filed Feb. 2, 1910. High powered station work.

1,175,424. Insulating Composition; W. K. Freeman, Oscawana, N. Y. App. filed Nov. 25, 1913. Embodies sulphuric cellouise liquid treated chloridic reagent.

1,175,433. Resistance Unit and Manufacture Thereof; J. G. Goetsch, Milwaukee, Wis. App. filed Aug. 2, 1915. Thin reflex resistance ribbon.

1,175,434. Motor Controller; M. M. Goldenstein, Milwaukee, Wis. App. filed Oct. 10, 1913. For automatically slowing down and then reaccelerating.

1,175,441. Electric Controller; J. H. Hall, Cleveland, Ohio. App. filed Oct. 30, 1911. Resistance-controlling switches controlled by current in motor circuit.

1,175,442. Electrical Cooking or Heating Apparatus; M. W. Hanks, Indianapolis, Ind. App. filed Nov. 30, 1914. For cooking eggs in predetermined time.

1,175,444. Signal Box; B. B. Hatch, Boston, Mass. App. filed March 27, 1915. Wallbox mounting compensating for tilted position of box.

1,175,450. Cabinet for X-Ray Apparatus; G. R. Hogan and H. P. MacLagan, Chicago, Ill. App. filed April 13, 1914. Operator protected from rays.

1,175,452. Lightning Arrester; R. P. Jackson, Edgewood Park, Pa. App. filed Feb. 21, 1911. Electrolytic cell type.

1,175,470. Water Heating Apparatus; F. C. Perkins, Buffalo, N. Y. App. filed May 10, 1915. Electric heater which may be operated in conjunction with fuel burning heater.

1,175,472. Coupling for Electrical Oscillation Circuits; R. H. Rendahl, Liljeholmen, near Stockholm, Sweden. App. filed Sept. 7, 1911. Has no undesirable influence on oscillation circuit.